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ISSUE 065

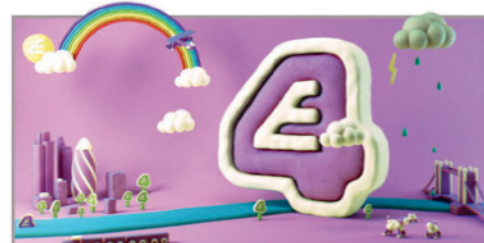
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**Mind-
blowing
photorealism**
page 50

Artist info



Mao Lin Liao

Personal portfolio site

www.knitandigital.nl

Location The Netherlands

Software used

Maya, ZBrush, Arnold



Photorealism is no easy goal, but hopefully with the use of our in-depth tutorials your journey will be somewhat eased. Throughout this issue you will find tutorials on human renders (p50), glass in CINEMA 4D (p86), LightWave product shots (p90) and Maxwell Render V3 vegetation (p74). Enjoy the issue!

“We will discuss the techniques that come in useful when creating a realistic female model. We will be using ZBrush not only for modelling, but also as a grooming tool for achieving photoreal hair”

Mao Lin Liao reveals his photoreal workflow **Page 50**



Create a stunning action shot Page 66

3DArtist

Imagine Publishing Ltd
Richmond House, 33 Richmond Hill
Bournemouth, Dorset BH2 6EZ
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Web: www.imagine-publishing.co.uk
www.3dartistonline.com
www.greatdigitalmags.com

Magazine team

Editor Chris McMahon
chris.mcmahone@imagine-publishing.co.uk
✆ 01202 586239

Editor in Chief Dan Hutchinson

Staff Writer Larissa Mori

Sub Editor Philippa Grafton

Senior Designer Chris Christoforidis

Photographer James Sheppard

Senior Art Editor Duncan Crook

Head of Publishing Aaron Asadi

Head of Design Ross Andrews

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Contributors

Gustavo Åhlén, Orestis Bastounis, Benjamin Brosdau, Craig A Clark, Jesús Fernández, David V Finlay, Lee Griggs, Paul Hellard, Mark Lee, Michael Levine, Mao Lin Liao, David Scarborough, Dave Scotland.

Advertising

Digital or printed media packs are available on request.

Advertising Director Matthew Balch ✆ 01202 586437
matthew.balch@imagine-publishing.co.uk

Head of Sales Hang Deretz ✆ 01202 586442
hang.deretz@imagine-publishing.co.uk

Advertising Manager Alex Carnegie ✆ 01202 586430
alex.carnegie@imagine-publishing.co.uk

Account Manager Ryan Ward ✆ 01202 586415
ryan.ward@imagine-publishing.co.uk

Cover disc

Junior Web Designer Steven Usher
3dextrahelp@imagine-publishing.co.uk

International

3D Artist is available for licensing. Contact the International department to discuss partnership opportunities.

Head of International Licensing Cathy Blackman
✆ +44 (0) 1202 586401
licensing@imagine-publishing.co.uk

Subscriptions

Head of Subscriptions Gill Lambert

To order a subscription to 3D Artist:

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Circulation

Head of Circulation Darren Pearce ✆ 01202 586200

Production

Production Director Jane Hawkins ✆ 01202 586200

Founders

Group Managing Director Damian Butt

Group Finance & Commercial Director Steven Boyd

Printing & Distribution

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Welcome

to the magazine and 116 pages of amazing 3D



Hello and welcome to 3D Artist magazine!

When it comes to CG photorealism there are few challenges more difficult than tackling the face of another human being. The fine details required to convince a well-trained eye that they're looking at pores, not pixels, are absolute. Nevertheless, Mao Lin Liao's work on cover image Alex is a fine example of what can be achieved with dedication, passion and hard work. Turn to p50 to learn how he achieved this amazing work of 3D art.

Chris Editor

Every issue you can count on...

- 1 Exclusively commissioned art
- 2 Behind-the-scenes guides to images and fantastic artwork
- 3 A CD packed full of creative goodness
- 4 Interviews with inspirational artists
- 5 Tips for studying 3D or getting work in the industry
- 6 The chance to see your art in the mag!

This issue's team of expert artists...

Mao Lin Liao



Expert 3D freelancer Mao discusses his workflow for this issue's amazing cover image, starting on p50

Jesús Fernández



Jesús reveals how to create scenes reclaimed by nature in his overgrown foliage tutorial on p58

David V Finlay



All portfolios need one image that really pops off the page. David reveals how you can create yours on p66

Benjamin Brosdau



Using our 90-day trial of Maxwell Render, you can follow Benjamin's in-depth tutorial on rendering vegetation

Mark Lee



Uniform's senior CG artist Mark showcases how he and his team delivered stop-motion visuals for E4

Lee Griggs



Arnold expert Lee offers an introductory workflow to the software, perfect for those yet to try it out

Gustavo Åhlén



In keeping with our theme of photorealism, Gustavo tackles glass bottles in CINEMA 4D over on p86

Michael Levine



Michael takes a closer look at how Autodesk's new tool XGen can be used to ease the creation of CG hair

Craig A Clark



Starting on p90 Craig takes us through the step by step process for achieving realistic renders in LightWave

Orestis Bastounis



Whether you're a Mac fanatic or a PC devotee, Orestis has you covered with Mac Pro and M3800 reviews

Dave Scotland



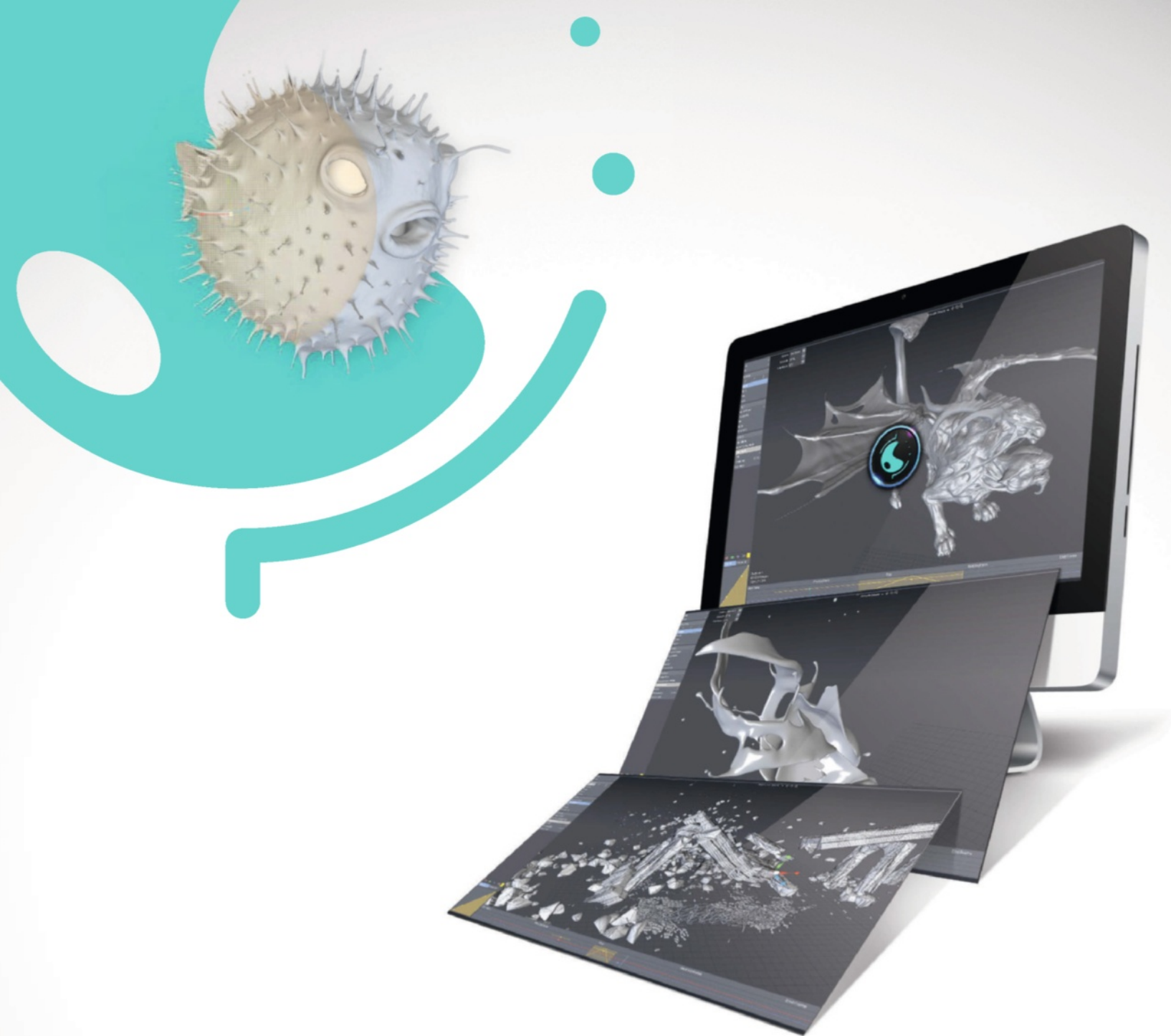
NUKE 8.0 is here, and Dave is on hand to state why this is probably the best version of the compositing tool to date

Paul Hellard



3D expert Paul takes a look at the world of invisible VFX, asking top studios how they hide their CG work

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The 3D scanning revolution

“Some people find this scary and in some ways I do too, but it's also very exhilarating”

John Mahoney discusses how 3D scanners are changing everything Page 32

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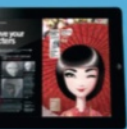


Astounding action scenes

74



Render vegetation in Maxwell Render



Free tutorial files available at:
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“Without digital compositing in the VFX pipeline, films would not have been able to advance visually in the last 30 years”

Chris Knight of The Mill discusses the nature of compositing Page 24



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Turn to page 112 for
the complete list of
the disc's contents



WELCOME TO THE GALLERY

Seven pages of great artwork from the 3D community *Images we love!*



Artist info



Caetano Silva

Caetano started working with 3D while helping his father, a 2D illustrator working in advertising

Personal portfolio site

<http://caetanosilva.com>

Country Brazil

Software used ZBrush, MODO, Photoshop

Work in progress...



“ This work was an in-house ad conceived by Eduardo Martins, co-owner of Un Mariachi 3D Studio. The idea was to show that while we suck at making dog food, we can hold our own with 3D stuff! ”

Caetano Silva, *Dog*, 2013

Have an image you feel passionate about? Get your artwork featured in these pages
Create your gallery today at www.3dartistonline.com

Or get in touch...



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“What a fun image! The vibrancy of the colours, playful cartoon character designs and messy environment result in an in-house ad you can barely take your eyes off”



Larissa Staff Writer



Artist info



Adam Martinakis

Adam has been working and experimenting with CG and visual media for around 13 years

Personal portfolio site

<http://adamakis.blogspot.co.uk>

Country UK

Software used DAZ 3D, 3ds

Max, V-Ray, Photoshop

Work in progress...



“ The abstract shapes combine with the tactile nature of the gold texture, resulting in an intriguing piece of work ”



Larissa Staff Writer

“ Materialized v01 is the first work in a series of images relating to the metamorphosis of parts of a human body. The transition is witnessed in several different material zones ”

Adam Martinakis, *Materialized v01*, 2013

Artist info



Gangqiang Yu

Gangqiang is a 3D artist who works in videogame posters and commercial 3D production

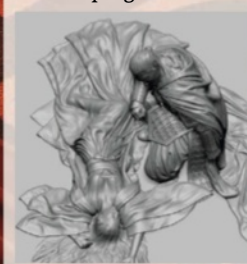
Personal portfolio site

<http://dabao.cgghub.com>

Country China

Software used 3ds Max, Maya, ZBrush, Photoshop

Work in progress...



“ We know we’re looking at a 3D image, but we feel like we’re admiring a work of art hung in the Louvre ”



Chris Editor

“ This piece is based on a well known Chinese story: the hegemonic king of the Western Chu’s concubine committed suicide before her king as they were under siege. I based my artwork on this love story ”

Gangqiang Yu, *Farewell My Concubine*, 2013

THE GALLERY

“I was impressed by some great Corona renders so I decided to try it myself. I picked models from the Evermotion Archmodels collection, and as the shader system works like other renderers, it wasn't too hard to get a good result.”

Tobias Hoffmann, *Christmas Still Life*, 2013

“This is an excellent example of the incredibly photorealistic results that can be achieved when using the Corona renderer.”



Larissa Staff Writer

Artist info



Tobias Hoffmann

3DArtistonline

Username: postwendend

Personal portfolio site
<http://postwendend.com>

Country Germany

Software used 3ds Max,
Corona, Fusion

Work in progress...





Artist info



Eugene Gittsigrat

3DArtistonline

Username: Eugene Gittsigrat

Personal portfolio site

www.gittsigrat.com

Country Russia

Software used ZBrush, Maya, MARI, Arnold, NUKE

Work in progress...



“The detail on this image is great, but the amount of personality Eugene has also added to his chimp character is just amazing!”



Larissa Staff Writer

“This was a spontaneous personal work. I wanted to make a monkey as I’ve never created that type of character before, and I decided to add a college football helmet to give the chimp more narrative interest”

Eugene Gittsigrat, *The Champion*, 2013



Artist info



Adam Sacco

Adam is a freelance 3D artist and has worked on projects for both local and global clients

Personal portfolio site

www.soulty.com

Country Australia

Software used

3ds Max, ZBrush

Work in progress...



“ You may recognise this character from issue 61's The Evolution of CG



Software feature! ”

Chris Editor

“ Alien March was inspired by the apes that patrol through forests like soldiers. The alien at the rear is pointing to a situation in the distance that has captured a few of the aliens' attention ”

Adam Sacco, *Alien March*, 2013



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The final sculpture as seen at the London and Paris 3D Print Show exhibition in 2013

3D-printing fine art

Traditional artist duo Masters and Munn reveal why they turned to 3D printing to complete the delicate feathers on their latest sculpture, *Icarus had a Sister*

Company
Masters and Munn

Project
Icarus had a Sister

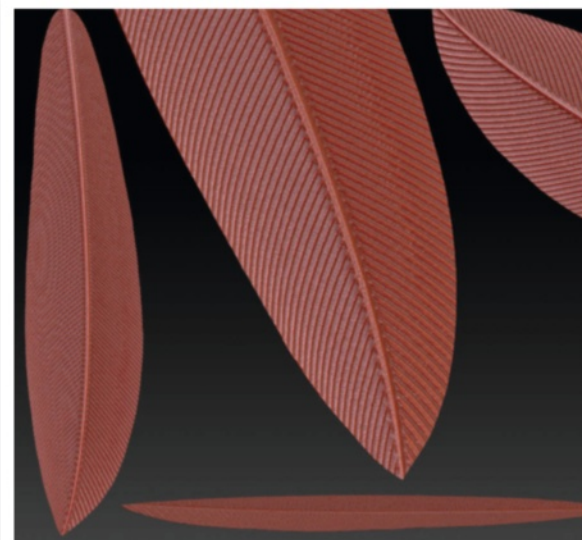
Website
www.mastersandmunn.co.uk

Hardware used
Desktop PC using Windows 8 Pro, Wacom Cintiq 24HD

3D Software used
ZBrush, FreeForm

"Around ten years ago, we were invited to see a demo of what 3D scanning and printing could do in terms of replicating the human form and at the time it was pretty clunky, low-resolution stuff. We felt neither inspired nor threatened by it," begins CJ Munn. "However, a couple of years ago we saw a sudden turn of the tide. Videos of wonderful, beautiful and imaginative things people were creating with 3D printing and digital art were cropping up every day. We realised that the advances in technology were going to be a direct threat to our lifecasting business."

As Masters and Munn, art duo CJ Munn and Andre Masters have earned national and international art awards for their varied approaches to traditional sculpture. For Munn the increased public attention on digital work provoked a meltdown – it convinced her that everything that she had ever loved about making art with her own hands would be taken



Digital 3D feathers created by extruding an alpha created in Adobe Photoshop, which was then imported and modelled in ZBrush

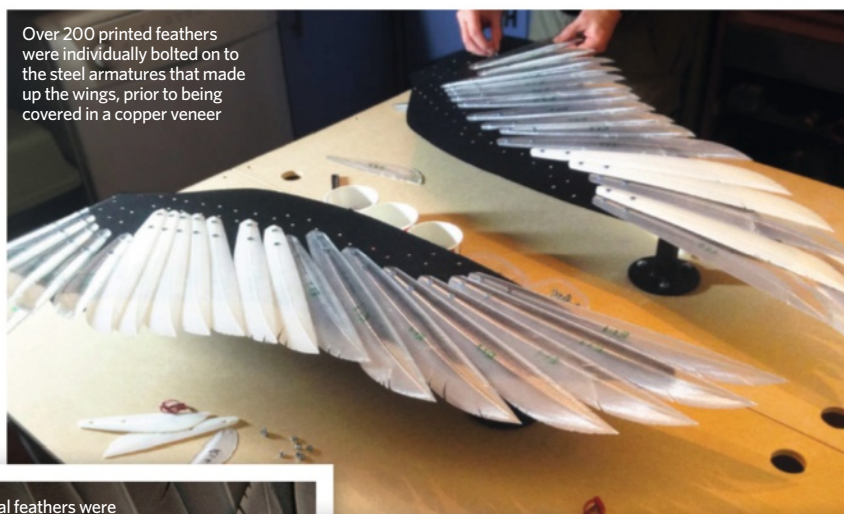
away, replaced instead by a machine. For Masters, however, it was not such a hopeless situation. His career as a modelmaker meant he was used to having to adapt to new technologies when necessary, and as such he became increasingly inspired by what he had seen other artists do with these new machines. Over time Masters managed to convince Munn to see 3D modelling and printing as technologies that could open up new opportunities as opposed to reducing them, and he decided to search for a 3D printing company to ask for advice in learning more.

"The company in question was Industrial Plastic Fabrications Limited, and the person who answered the phone was Gary Miller, a UK expert in the field of rapid prototyping," remembers Munn. "André said 'Hi, we're artists looking to work with 3D Printing', and Gary replied, 'That's great, we're looking to collaborate with some artists for the 3D Print Show.'" Miller looked at the Masters and Munn website and a concept design Masters had created in 2004 named *Icarus had a Sister* caught his eye. In nine years, the couple had never found a way to build the delicate wings of the piece with the level of detail desired – but by 3D printing the feathers using Stratasys Objet Connex machines, Miller told them, they just might be able to.

"The next big challenge was learning how to use the software," Munn explains. "Watching hundreds of how-to videos is very different to actually getting stuck in, and we're not ashamed to say that we found it incredibly challenging trying to get our heads around ZBrush. We ended up getting help and private tuition from industry experts – Alex Down, Simon Grell and Jonathan Reilly. Sometimes ridiculous things can slow you down or make your system crash and, as a beginner, you might not know if it's something you've done wrong, a particular quirk of the software you're using, or a hardware glitch. Having seasoned professionals a phone call away stopped us from pulling our hair out!"

Despite the high costs of 3D printing combined with that of the 3D software they needed to complete the sculpture, with the help of their savings, Industrial Plastic Fabrications Limited and a very successful Kickstarter campaign, *Icarus had a Sister* was ultimately completed in time for the show. "When the first test feathers came back from Industrial Plastic Fabrications Limited our skin was literally covered in goose pimples from excitement," says Munn. "We finally had the lightweight, flexible, delicate, detailed and stunning feathers just as we'd always envisaged them. Suddenly a whole new world of possibilities opened up to us." The two artists went on to win the Global Rising Star Award for their work at the 3D Print Show Awards, one of only three awards that comes with a bursary to help finance future art.

"Having had a taste of 3D modelling, we are now absolutely addicted to it, despite knowing we have an awful lot to learn," says Munn. "By using 3D we can show each other our ideas instead of trying to draw them on the back of a napkin – using ZBrush almost like a 3D sketchbook. Sculpturally, it enables us to create things that were just not possible with traditional methods – objects of such incredible detail and complexity that don't require internal armatures for support and scaled to any size you could imagine."



Over 200 printed feathers were individually bolted on to the steel armatures that made up the wings, prior to being covered in a copper veneer



The digital feathers were printed at a resolution of 30 microns, with individual details then added by hand using traditional techniques



Above is one of nine individual sculptures commissioned for Thomas Hoblyn's Foreign and Colonial Garden, which won a Silver-Gilt Medal. The sculpture is made of electroformed copper

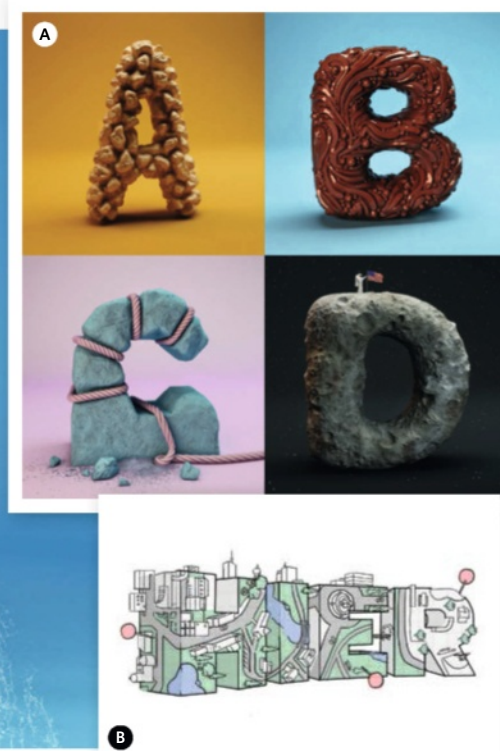


Above is the original lifecast of the female figure. It was remoulded in silicone and fibreglass and recast in a quartz, marble and crushed pearl aggregate that shimmers with tiny crystals

Artist Profile

A self-taught artist, Munn has worked on many high-profile jobs, creating large sculptures for clients as diverse as the WWF and Kate Bush alongside partner André Masters. After first meeting on an online lifecasting forum, Masters, who was an experienced modelmaker working in the film and advertising industry, mentored Munn in the early years of her career. "Within a year, André's teaching had paid off so much that I was able to start hiring him for my own commercial jobs. It was the start of a great working partnership," remembers Munn. "The passion we shared for our creative work grew and we have been working our socks off ever since, trying to survive and adapt in a constantly challenging art industry."

Retouching and colour grading in Photoshop is the final step in an illustration, with attention placed on solid composition and colour



3D typography evolved

Co-founders of FOREAL design studio Benjamin Simon and Dirk Schuster offer their tips on creating great CG typography

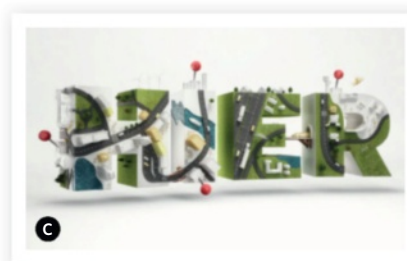
Having just founded their own design studio in January last year, Benjamin Simon and Dirk Schuster tell us that for them, 3D represents a whole new playground for illustrators. The studio's team of four decided to explore 3D as well as 2D techniques to create their designs, primarily using CINEMA 4D along with Photoshop and Illustrator. FOREAL has already produced 3D typographic artworks for clients such as Talk Talk, Red Bull, and Scientific American.

For Schuster, creating a great image featuring 3D type depends entirely on the effect that needs to be achieved. "Sometimes the type needs to represent the story told within the frame," he explains. "Other times, it is simply made up of an illustrative style that underlines the type's meaning. Either way, it shouldn't ignore basic typographic rules." Here, the FOREAL team reveals their top ten tips for creating eye-catching and visually exciting 3D typography.

- Develop a good sense for typography and its proportions. Only after defining the proportions and composition as a digital sketch will we start with the 3D modelling process.
- Always start with a two-dimensional base. A broken two-dimensional typographic setup can't be fixed by putting it in the next dimension. You really need a good base.
- The ideal spacing of a word changes with its perspective and the camera's focal length. If the type is not facing straight to the viewer, try to increase the font width and spacing.
- There are different approaches to creating 3D type. Extruding an existing path isn't always the best way to go. Gain expertise in different modelling techniques so you can mix

different techniques. Begin with clean box-modelling before starting on the sculpting process.

- The real world doesn't contain that many hard, straight edges. Extruded type often needs bevelled edges to present a more realistic look.
- Type needs an appropriate environment to get the best effect. Working with a reduced and defined colour palette can create a more effective end result.
- It's also important to recheck the legibility of your 3D typeface. Consider the amount of detail you want to put in. A short single word offers more variability within the overall artwork than a long sentence where things get lost.
- Work carefully with the lighting. Highlights, shadows and reflections can either support the legibility of the type or it can work against it, muddying the intended message.
- If you are placing objects and textures on a letter, try to arrange them along the native path direction of the text to support the flow of the type.
- A typographic illustration often needs retouching after rendering. If you want your type to pop out more, it helps to use adjustment layers in Photoshop to increase contrast or to fine-tune colours.



A Along with Adobe Photoshop and Illustrator, the team uses CINEMA 4D and a variety of useful plug-ins, tools and render engines to create their final typographic illustrations

B C "We always start with a two dimensional, flat setup for our type on its final artwork proportions before starting with any kind of 3D software," explains Schuster

D After defining the composition as a digital sketch, the FOREAL team models the type before working and adjusting the lighting and textures



Humster3D vehicle renders

The winners of the Humster3D Vehicle Render Competition tell us what it takes to create the perfect 3D car render

What inspired you to create your 3D vehicle render and to enter it into the competition?

First place winner, Roland Wolf: I wanted to show a moving car from a three-quarter perspective. From this kind of viewpoint you get a certain steering angle that looks more dynamic. In the middle of the process I read about this competition and decided to participate.

Second-place winner Jochem Aarts: I like hot rods and muscle cars and the raw sound of V8 engines. One of the most iconic hot rods is the Ford Model B Deuce – this thing breathes power. That's why I chose this car, and it had to be placed in front of a Speed Shop, of course. It would've been easier to grab a back plate, but that wouldn't give the same vibe.

When you enter a competition you always hope to do as well as you possibly can. You know that a lot of artists create car and vehicle renders, so the competition is hard. I never expected to win!

What were the main challenges and successes you encountered throughout the creation of the image?

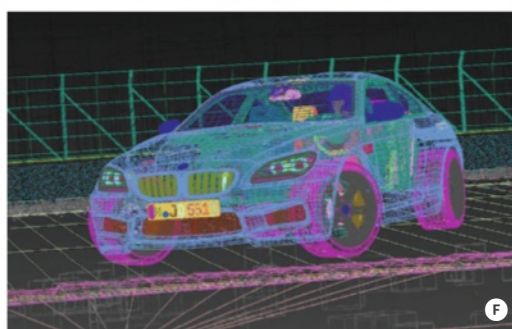
Third-place winner, Khusnutdinov Nail: The main issue is always collecting reference – good pictures and dimensions. My car was produced a relatively long time ago and there are a lot of small differences depending on the year of release. I had to figure out how to create the 1981 version and find firm catalogues to help.

Jochem Aarts: Research. I think that's one of the most important steps to start with. You can see the difference in submitted work from someone who just started putting car paint-shaders on a downloaded model and an artist who did some research about the car and its appearance.

Could you share with us a few of your tips for creating the perfect vehicle render?

Roland Wolf: When modelling, collect as many reference images as you can or go to a local dealer and take a test ride with a camera in your bag! Pay attention to the details and give weight to the whole body – a car is built to drive, so move it. Make sure you invest some time in the headlights because these are the eyes of a car. Remember that not everything has to be done in 3D – use post-production to tweak the end result.

I'd recommend a 3D package that supports your desired renderer and that puts out the right passes for the desired post or compositing software. If I were just starting I'd try MODO or Maya with V-Ray or Arnold, and NUKE for the post. If you wanted to build a perfect car model you should use NURBS and special software such as Alias, Catia, or Rhino.



E F The winner of the competition was Wolf's BMW M6 render, created using 3ds Max, Fume, V-Ray, and NUKE

G "A good technique is to create an image that tells a story or takes you to a certain place," explains second-place winner Jochem Aarts

H I Third-place winner Nail's image was created in a week with 3ds Max and V-Ray, showcasing a more vintage style of 3D vehicle





Images of the month

These are the illustrations that have been awarded 'Image of the week' on 3DArtistOnline.com in the last month

A You Picked Up The Wroooooong Bed Monster

» **Aamir**

3DA username Aamir

Aamir says: "The original illustration that this is based on was by Skottie Young. I worked on the modelling, texturing, lighting and look development."

We say: Aamir does it again with a good-humoured image that plays on the active imaginations of children. The composition of the piece is fantastic, with a real sense of dynamism from the splintered boards flying upwards.

B Warrior

» **Renato Gonzalez**

3DA username pehato

Renato says: "The main idea behind this model was to create a robot that had a sense of organic design without losing the mechanical structure. It was modelled with ZBrush and Maya."

We say: Half Deception, half insect, this six-legged mechanical beast is simply bursting with minute detail. From his serrated, armour-plated torso to the mechanisms underpinning his appendages, this is just fantastic work, suggestive of a terrifying dystopian future.

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to the artists

C Mastic Scum "C T R L"

» **Lucas Lancko**

3DA username Lukas1D5

Lucas says: "This was an illustration created for the Austrian band Mastic Scum. It depicts a futuristic vision of the technological evolution and development of society - the need to control and the inevitable collapse of a system."

We say: 3D needn't always be nice to be impressive. We love the detail that has gone into the various contraptions surrounding this dark skull. The final result is very reminiscent of the work of HR Giger.

D Old Bike

» **Petrit Mulaj**

3DA username MadeInBerlin

Petrit says: "I used CINEMA 4D and V-Ray to create this piece. The rendering work took around two days."

We say: While technical skill is always an important part of what makes an image sing, we also like for an image to stir something more emotional. Just looking at this picture immediately recalls memories from our trips away spent in picturesque European villages.





Image of the month



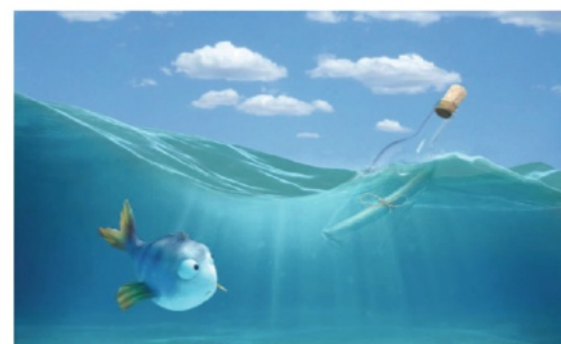
Total Recall Police

» **Gerard Muentes**

3DA username Macaco

Gerard says: "This was a game model that I created, inspired by the look of the characters in the 2012 *Total Recall* remake."

We say: This is top-notch work, and we wouldn't be surprised to see it appear in a triple-A videogame. It balances detail with simplicity – an important factor considering the memory limitations of even the most powerful game systems today.



Message In A Bottle

» **Christina Ames**

3DA username christinaames

Christina says: "This is a project I created during my internship at an advertising agency in Stockholm. I had lots of fun trying to master new software such as ZBrush and CINEMA 4D."

We say: Simple and soothing, this image showcases a great deal of skill for a beginner. The open ocean and blue skies provide the perfect framing for this minimal yet effective tale of a curious fish.



Oviraptor

» **Koen Koopman**

3DA username TBKoen

Koen says: "This is yet another revision of an old character of mine. I took a little bit of artistic license on the oviraptor, which is an egg eating raptor."

We say: Koen is an expert when it comes to characters, easily instilling any creature with a sense of cartoon joy and warmth. We love the third character here, sneakily poking his head out on the right of the image.



Indolent Corner

» **Mohammadreza Mohseni**

3DA username acinonyxlord

Mohammadreza says: "This is a close up of my new chair design. I used 3ds Max, V-Ray, Pdpayer, Photoshop, Marvelous Designer and PARA 3D."

We say: We absolutely love the tactile, photoreal feel of this cushion. It's not just the amazing textures and materials that sell the realism here, but the plump folds and curves of the pillow, and the way the light and shadow interacts with them.

Have your say

Email, Tweet or get in touch with us on Facebook to share your thoughts, opinions and proudest projects

Top tweets



Get involved...
@3DArtist

@AimForSabir Maybe late to the party but the new @3DArtist is excellent. Especially the tutorial from @Snefer

3D Artist We're glad you enjoyed it! Tor Frick is a modular texture genius!

@zenopelgrims The lovely chaps at @3DArtist decided to feature my latest piece. Happy days!

3D Artist If you liked Zeno's work, check out more at <http://graffik.be>

@imagine8ion Right that's it. No more work for this week, I am busy...

3D Artist Get stuck in - loads of tips!



On the Wall



Facebook.com/
3DArtistMagazine

What do you think of the new trailer featuring the first official clips from **Transformers: Age of Extinction**?

Robert Brown I'm impressed with the animation and modelling but the trailer doesn't make me want to watch it. Let's hope they all stay to scale this time.

Mike Embleton Looks like the robots were added after the film colour grading. The reflections don't match.

Joe Laico Um...Optimus Prime riding a dinosaur? Awesome! All other points are invalid!



If you want to have your work or thoughts displayed here, get in touch with us via email at **3dartist@imagine-publishing.co.uk**, via Facebook at **facebook.com/3DArtistMagazine** or on Twitter **@3DArtist**



Frost Giant Facebook likes 1,377

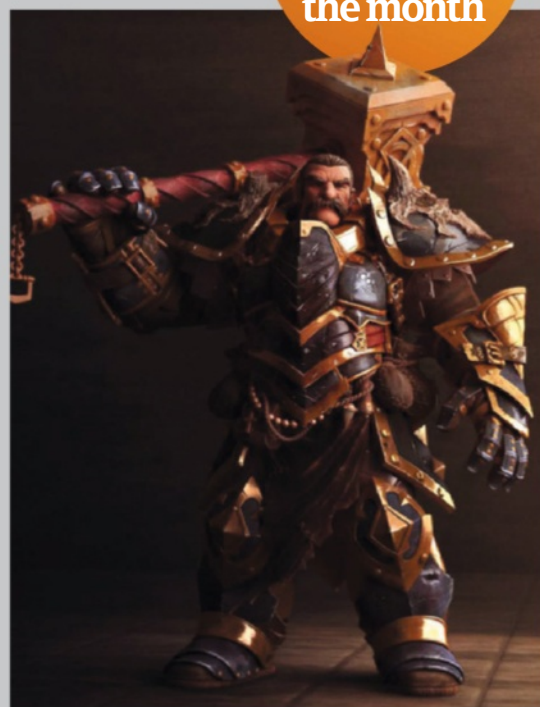
» **Eric Pochat**

We say: "If you want your character bust work to stand out, then make sure the face is expressive and the eye contact grabs the viewers' attention. This one does so brilliantly - we don't like him staring at us!"

Heavy Knight Facebook likes 2,178

» **Jose Rodriguez**

We say: "A character that could have walked straight out of a quest in *World Of Warcraft*, we love details such as the gold plating and the cracked bone shoulder guard on this staunch figure."



Social
media
images of
the month

Product design mega tutorial

Here's a three hour plus, seven part mega tutorial on creating an iPhone Breathalyser



product concept design. The tutorial covers modelling in Blender, creating a user interface in Photoshop, animating it in After Effects, creating a website home page mock-up in Photoshop, and then writing responsive HTML/CSS. Check it out at www.tinyurl.com/3DAProductDesignMegaTut

Gary Simon, via Facebook

Wow, that is one exhaustive tutorial on an incredibly interesting concept. Many thanks for sharing it with our readers, Gary. We're excited to try it out for ourselves!



YOUR TOP WALL POSTS



CINEMA 4D car

» **Paul Birdman**

Paul says: "I wanted to show my first car model, created using CINEMA 4D. I started to learn how to model in October 2012 and this is one of the best pieces of work I've made so far. Rendering was completed with V-Ray."



Winter Canal Exterior

» **Andrei Shah**

Andrei says: "This was created as part of my personal film, Elmstead & Close. I used 3ds Max to model the geometry, switched to Maya for texturing, lighting and rendering before taking it into NUKE for post."



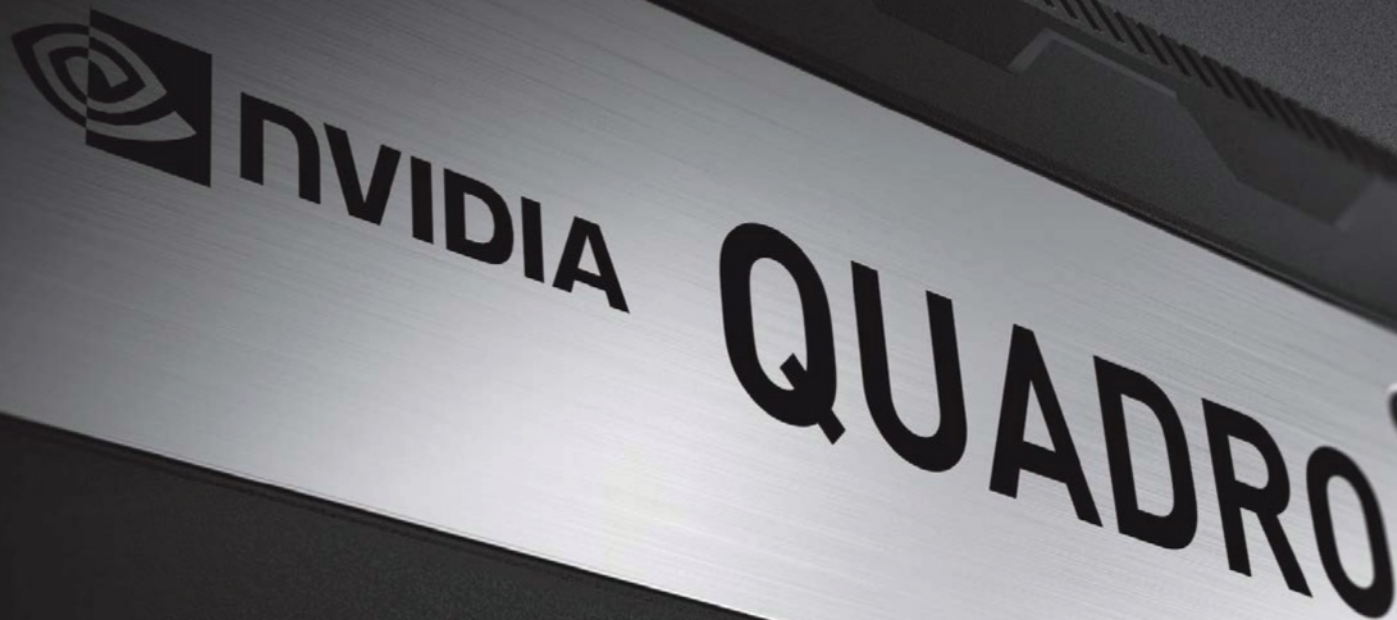
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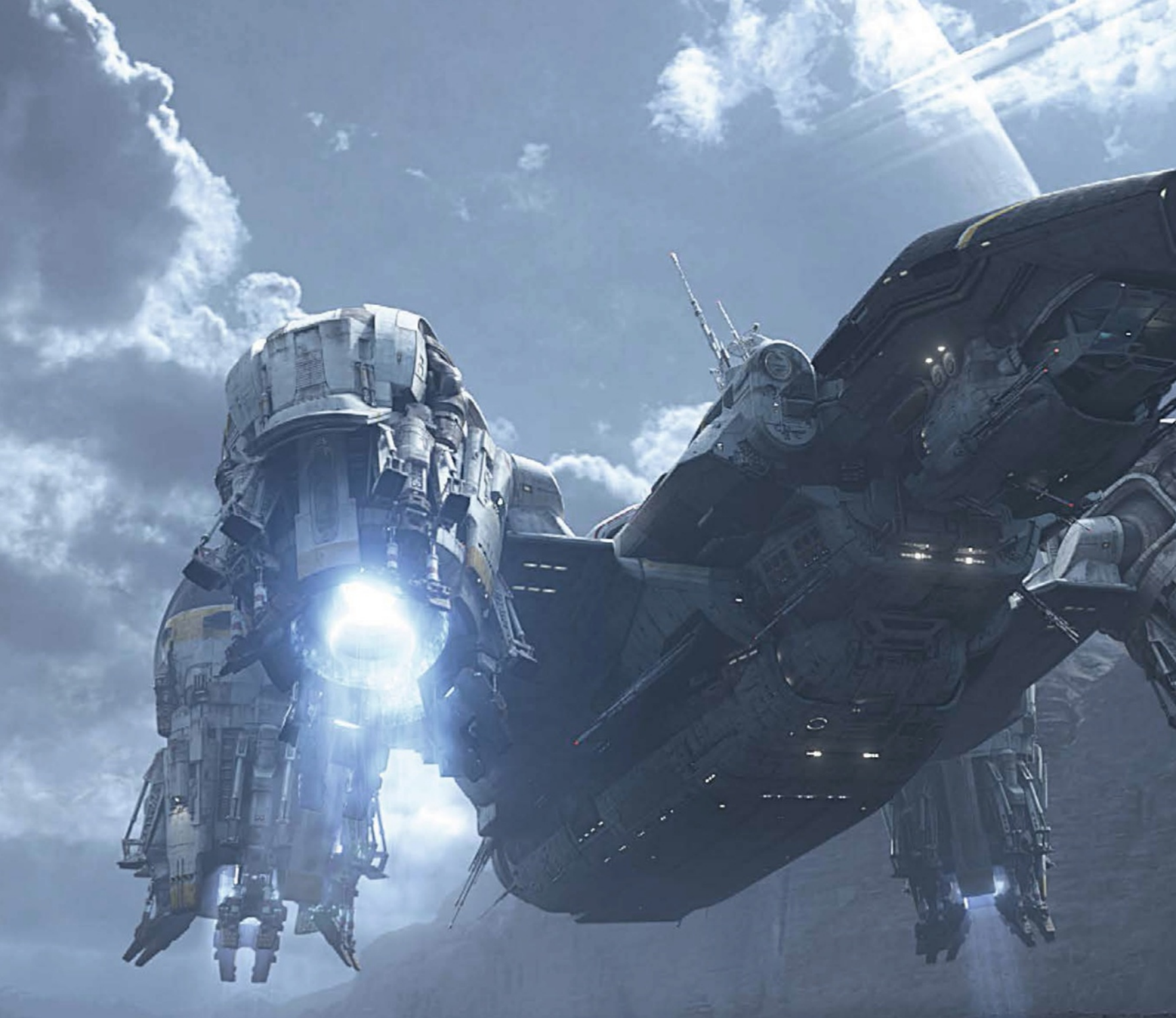
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PROFESSIONAL **COMPOSITING** TECHNIQUES



The crucial last step in the VFX pipeline, compositors are integral in making state-of-the-art visual effects appear both authentic and tangible. 3D Artist got in touch with some of the top compositors in the world to learn more about their craft



"In this shot there wasn't much to originally work with, just a sky plate that we graded and then added more clouds to from a different plate. The environment team delivered to us a background to blend with the sky"



"We rebuilt the ship from all the secondary passes, then we matched the blacks and the highlights to the graded plate, and then used the depth pass to give the ship a greater sense of scale. The thrusters themselves came next"



"We then worked on the smoke and dust that really sells the interaction of the ship and the ground. Finally there was the lens flare. Overall this shot was completed in the space of about three-four weeks"

Doug Lamour, MPC's global head of compositing

"Compositing is the most photographic of the VFX arts, as in order to sell the final image as a 'real' image all elements must be brought together in a way which mimics a photographed plate. The simplest way to think about compositing is that its visual collage, or Photoshop with moving images!"



KYLE CODY
The Mill, NY



ZAVE JACKSON
Cinesite



CHRISTIAN KAESTNER
Framestore



CHRIS KNIGHT
The Mill, LA



ALESSANDRO SCHIASSI
Freelance

Professional compositing techniques

“People tend to underestimate a traditional education in subjects like photography, fine art and physics”

Christian Kaestner, Framestore



Escape Studios offers a fantastic course in Compositing For Visual Effects. Learn more about this hands-on course at www.tinyurl.com/3DAEscapeCompositing

PIECING THE PUZZLE

They may come in at the back-end of the pipeline, but compositors are utterly fundamental to selling the spell-binding illusion of VFX. Compositors are the jigsaw puzzle masters, slotting together the disparate elements supplied by many varied artists into one seamless whole.

It's a job that ranges from some of the most VFX intensive shots imaginable, with hundreds of separate elements, right down to simple green screen image manipulation. Some artists focus on the forest while others on the intricate veins of a leaf, but it's a compositor's job to oversee each detail and ensure that every pixel in every frame is flawless. So what's the sign of a job well done? It's when all this work goes completely unnoticed by the audience.

“Without digital compositing in the VFX pipeline, commercials and films would not have been able to advance visually in the last 30 years,” states Chris Knight, head of 2D and creative director at The Mill in LA. “With more advanced technology, the software that we are using today has enabled us to create images that can genuinely deceive the viewer and produce images that we could only previously create in our vivid imaginations.”

While the process has advanced massively in recent years, Zave Jackson, 2D and compositing supervisor at Cinesite – whose recent work includes *The Monuments Men*, *RoboCop* and *Skyfall* – reflects

on the humble origins of compositing. “Georges Méliès’ 1898 film *Four Heads Are Better Than One* employed matting techniques using blackened glass to limit which areas of the film were exposed,” he says. “The film was exposed multiple times using different mattes, creating a composite image within the camera. The process evolved throughout the 20th century with the introduction of black screen and blue screen techniques to create travelling mattes. Matte paintings and pictures painted on sheets of glass were used as backgrounds and these are the humble beginnings of a technique that is still used in the digital world.”

These days, most film productions will go entirely through a digital post-production process where every single sequence of the film is digitised. By doing this, filmmakers have complete freedom to modify and alter almost every shot in a film. Over the course of more than a century, what was once a simple A over B methodology has transformed into a complex and intricate art form of combining several hundreds of layers and masks over several thousand operations.

“Compositing is an art,” says freelance compositor Alessandro Schiassi. “The role is extremely important in regards to giving flexibility to the entire workflow. By compositing, you are facilitating changes and tweaks. At the end of the day it's absolutely essential in creating and accomplishing the director's vision.”

Tips from The Mill

The Mill's Kyle Cody offers a series of technical and general compositing tips

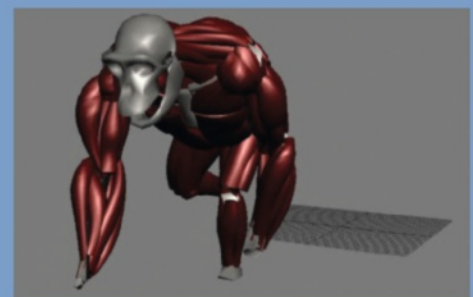
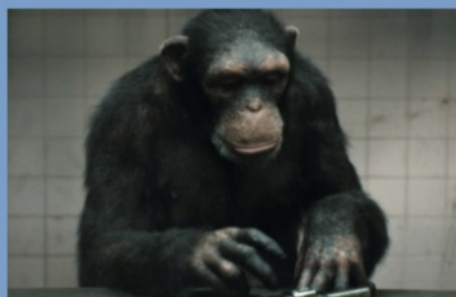
- 1) Imperfections make perfect composites** No man-made image is ever perfect, so why would your composites be? It is the subtleties and imperfections in a composite that make it feel cinematic, emotional and real. Lens artefacts, flares, blur, defocusing, grain, or just plain colour and value variation are all things that will help bring your comps to life.
- 2) Without reference, there's no realism** Before you start a composite you should always look at references. Nothing is more real than photography and video, so looking at things like exposure or colour in photographs is the first step to a successful comp. If you get stuck on why a comp doesn't look good, go back to your reference, maybe it's a reflection or the colour of a shadow – the answers are always there.
- 3) Matte and fill separation** Always keep your matte and fill separate before combining them when you are ready to comp them. Creating your matte and your fill separately is also important for a successful comp. The sheer simplicity of that will ensure you have clean edges and a solid composite.



- 4) Colour theory** This is fundamental for any compositor because colour plays such a huge role in both our emotions and in making a composite sit well visually. Knowing what colours to add to an image or knowing which colours are complimentary to make another colour stand out more are all relevant concepts in compositing. Knowing these will make you a faster and more efficient compositor.

- 5) Photography** The key to making a successful image is always based around the principles of photography – composition, the use of light and shade, the use of lenses, frame rates and shutter speeds are all key points in a beautiful image.

- 6) Film principles** Knowing shot design, directing principles and editing fundamentals are also important when compositing. It will make you a better lead artist if you have a greater understanding of the bigger picture in a spot.



THE RIGHT TOOLS

Today, compositors all share an understanding of lighting, colour and composition. However, due to the evolution of technology there's a number of different ways to put a composite together. While artists are forced to adapt as technology and software continues to rapidly evolve, the principles and fundamentals of the process remain the same.

Kyle Cody, senior compositor at The Mill in New York, guides us through the fast-paced and precise nature of one of his recent projects. "While working on PETA '98% Human', in which we created a completely lifelike 100% CGI chimpanzee, we had dailies in the morning and then dailies again in the evening to review not only animation, but also lighting and compositing all at the same time," he details. "Because we were doing such complex and subtle animations, simply rendering out playblasts or greyscales wasn't enough to be able to feel the animation. So twice a day I would comp the new CG renders of the chimp in order to review it with the director and the team.

"After each of the dailies I would then work on finalising the comps and setting up the 3D compositing system in NUKE," Cody adds. "The compositing work on PETA was also very delicate in order to finalise the comps. A lot of artistic attention was given to the eyes of the chimp, while also drawing the viewer to areas of the frame with plenty of light, shadow and colour."

On a day-to-day basis, a lead compositor is not only busy with the organisation of shots and the edit, but also maintaining the artistry of the spot. The process differs between compositors but the bedrock of compositing is NUKE, though Cody mentions other software essential to the process.

"I am a lead NUKE compositor. However, in order to run jobs and maintain an edit I use Smoke on a Mac, known as SMAC, for all my timeline and editorial needs," he explains. "While on PETA I conformed all the various plates and elements on my SMAC. The whole edit lived here and could be viewed for client presentations or for dailies with the director or the team. NUKE, however, is where most of my time is spent. On PETA I had a 3D system set up in each of the comps – basically every comp was a 3D setup within NUKE. The back wall, the glass and the table were all elements that were projected onto geometry in NUKE, using the same camera used in Maya/XSI from the 3D team."

Christian Kaestner, compositing supervisor at Framestore, agrees. "At Framestore we've settled mainly on NUKE by The Foundry," he says. "It enables a very good integration into our pipeline and has an incredibly wide selection of tools that mean our artists can work very efficiently, even on very complex work. Its image manipulation tools are state-of-the-art and with its 3D capability, NUKE allows for element integration even on the most complex of shots."



Footage



Diffuse, dirt, GI and lighting

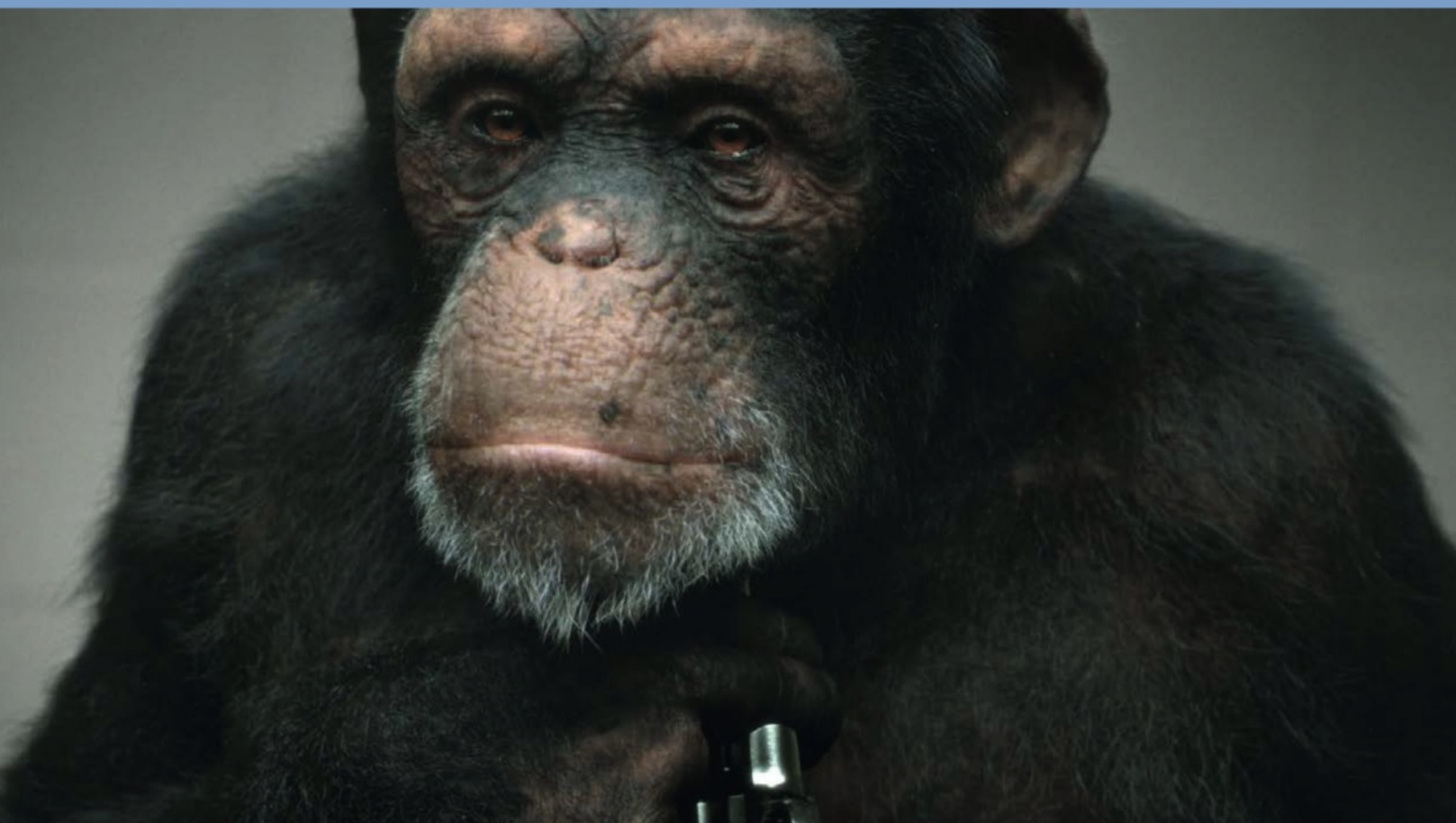


Shadow

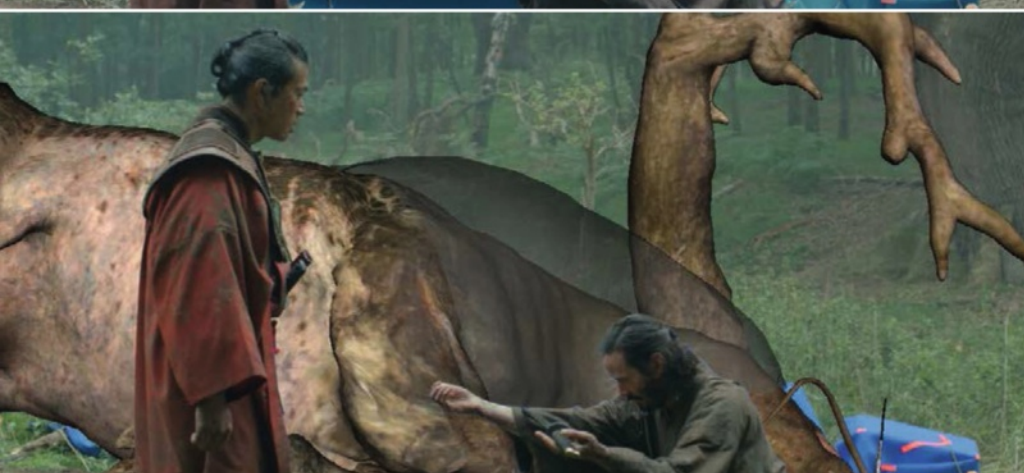


Colour matching

The process of incorporating VFX realistically into a scene requires professional compositing programs such as NUKE or After Effects



Professional compositing techniques



OVERCOMING CHALLENGE

"It may sound straightforward to combine elements with one another, but every shot brings its own challenges," Kaestner muses. "The process of compositing a shot may be similar, but the tasks are very different every day. On *Gravity* for example, the methodology was very similar for most parts of the film, though creating what seemed to be endless camera moves involved a lot of planning."

In this case Kaestner worked alongside entire teams of compositors that were purely responsible for the generation and look of the view from space, while others concentrated on the finer details of constellations and star exposure and yet another group worked on the interior design of the shuttle and the International Space Station.

"At this point, we still didn't have a single shot," adds Kaestner. "We had cameras and backgrounds, but the photographic plates of the actors still needed to be combined and merged together in very complex ways to eventually create the illusion of very long, seamless one-take shots."

It's fair to say that the day-to-day process of a compositor is hard to define as it differs so widely from one project to the next. For Schiassi, as software becomes increasingly advanced to a level where anything is possible, it's the close scrutiny of filmmakers that presents one of the biggest challenges for compositors.

"Directors are making any kind of change at any moment, so the main challenge is time," he says. "What used to be a locked shot could now get more reviews and we'll be asked to improve it constantly, until the very deadline. What used to be 'how can we make it look better,' is now more, 'let's find all the mistakes!'"

"An experienced compositor is able to spot what's wrong in a shot and fix it promptly," Schiassi continues. "However, often we get trapped in a looped shot quality control when instead we should focus more on the entire scene, how it flows and how it tells the story visually. Because at the end of the day, that's what we are doing - we are telling a story, not making abstract art."

THE NEXT GENERATION OF COMPOSITORS

As the demands of filmmakers and the expectations of the viewing public have increased over the years, it's never been tougher to be a compositor. Today, while compositing software can manipulate and combine literally hundreds of separately created images - creating scenes that simply wouldn't be possible otherwise - the key for young artists looking to get into compositing goes beyond just learning the tools of the trade.

"Anybody can learn how to use a tool but it is training your brain and most importantly your eye in how to use those tools that will make you a good compositor," says Cody. "Learning the principles of photography and film are key in achieving this. So is recognising a good composition; knowing what complimentary colours are and how to use them; how exactly to draw a viewer's eye around the



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Compositing improvements

Cinesite's Zave Jackson discusses his recent compositing work on *RoboCop*

A Enter RoboCop "In this recent example from *RoboCop*, we have this shot that required a great deal of compositing alterations. Like many shots on this project, our task was to make improvements and modifications to the suit worn by the actor filmed on set to improve the general effect of the scene."

B Body replacement "RoboCop's head was working fine but we needed to add CG mechanics visible between his armour plating and slim the suit down a touch. Also, for continuity reasons it was necessary to modify certain armour panels. The approach taken was to do a full body replacement of the actor from the neck down."

C Rebuilding "What happened next was that the comp team created a clean plate that would entirely remove the actor. This meant rebuilding large sections of the bike. As we had geometry for this we used projection techniques in NUKE to project clean frames of the bike sourced from photography taken on set."

D Final comp "Warping was used to tweak clean patches of bike into alignment. We rendered using V-Ray and the compositor received split out components. The geometry for the bike came in handy again at the final stage as it allowed modified shadows from the CG RoboCop to be projected over the contours of the bike."

frame; and understanding the difference between a good and bad edit. All of these things will make you a brilliant compositor."

As with most disciplines in the world of visual effects, persistence is key, with much of a successful compositor's skill set being based around patience and a desire for perfection. "Good enough is just not good enough in the job of a compositing artist," enthuses Kaestner. "Most importantly though, I think people tend to underestimate traditional education in photography, fine art, maths and physics. These skills are essential if you want to become a good compositor. The experience of having taken your own photos on film – and even going so far so as to have developed your own film – will open your eyes to so many things that you will need to become a good compositor. There are no plug-ins or tools that will just do all the work for you.

Your life will become so much easier if you take the time to better understand the basics of photography and film stocks."

Schiassi agrees with this Kaestner on this point. "Learn photography and cinematography. Compositing is essentially the art of placing elements in a shot as they were in the scene during the shooting. You have to know how a lens and a sensor work in order to replicate the same values and artefacts that a camera, no matter how good it is, would create. So elements of photography, from framing, composition and colours to noise, lens distortions, and depth of field are subjects that you must be familiar with before even starting to learn any graphic software."

"If people critique your work, you should always listen to their opinion," concludes Cody, explaining that compositing is not just about understanding

the craft, but graciously accepting feedback from others while also trusting in your own artistic instincts. "Sometimes they will be right and sometimes they will be wrong, but regardless of this, you should always listen to people's opinions before making your own decision, because ultimately you are the artist."

“Anybody can learn how to use a tool but it is training your eye that will make you a good compositor”

Kyle Cody, The Mill

Professional compositing techniques

Behind 'Big Night Out'

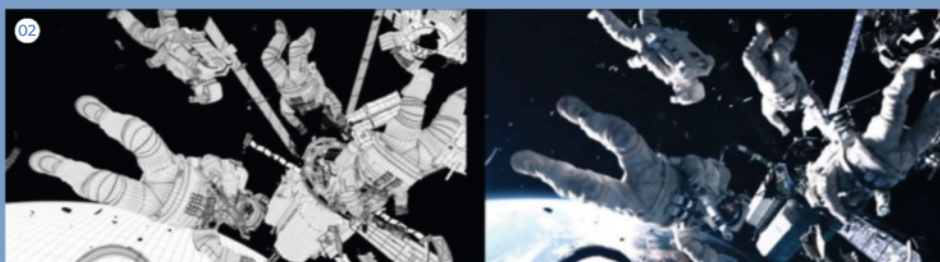
Chris Knight, creative director at The Mill in LA, discusses the creation of *Call Of Duty's* 'Big Night Out' commercial

01 Epic composite "Almost every shot of the edit required compositing for the finished commercial. Assets including projected matte paintings, fully rendered CG environments, CG aircraft and drones, explosions, fire and smoke, missiles and muzzle flashes were comped into location and studio-shot scenes."

02 Breaking it down "We began with breaking down the scenes and planning what we needed to create the finished shot. All shots were exported to CG for tracking as they all needed some kind of work."

03 Creating a pipeline "We worked on Log footage, comping in Linear with EXRs while using individual LUTs per shot for the grade. A pipeline was set up by our senior NUKE compositor for our 3D artists to NUKE to pre-comp and check their renders."

04 Final comp "Call Of Duty was an extremely collaborative process between 3D and 2D, working together and problem-solving the difficult shots. With continuously improving CG renders, progressing comped shots and the implementation of client comments on a daily basis we composited and finished around 63 shots."





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3D Artist explores some of the most prominent 3D scanners in use today to learn more about this new technological revolution



3D scanning

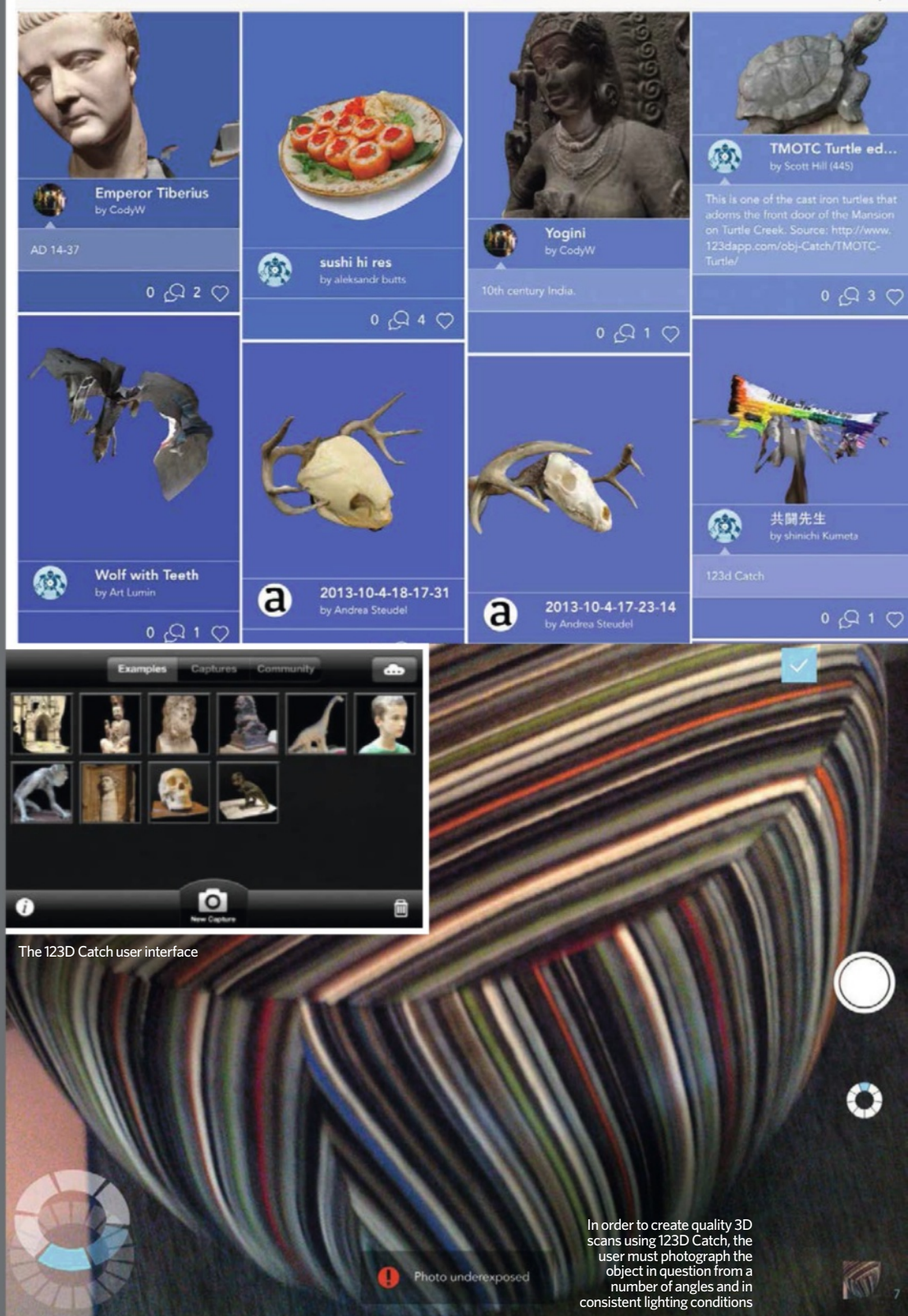
A tourist admires a city's most celebrated statue. They take out their smart phone, snap a few pictures of the statue at different angles as they walk around it, and move on to the next attraction. Only this isn't just an ordinary set of photos – it's a 3D scan, instantaneously capturing hundreds of points per square inch to produce an incredibly accurate 3D model of the statue. Later, it can be optimised further in 3D software at home, or even 3D printed in a variety of materials as the perfect mini-souvenir.

According to Artec Group chief business development officer Leonid Volkov, this will become a typical part of daily life within the next five years. "What really inspires me is the kind of reinvention of photography that 3D printing and scanning is a part of," he begins. "The technology still requires a lot of optimisation, but in a couple of years it will be fully automatic, very affordable and widely available. Everyone will have a 3D camera just to capture those special moments in our lives with such unprecedented quality – so much better than now. It's all about going the same way as photography, but with many more capabilities."

3D scanning is currently marketed alongside 3D printing as brand new way to create. Despite 3D scanning having only recently become an option, the technology has actually been a reality for years. "We first launched our 3D scanner in January 2006," remembers NextEngine marketing director Dan Gustafson. Although 3D scanning wasn't actually a novelty back then, it was still so expensive that the only people who ever had access to it were high-end professionals. "At that time, the closest competitor that we had cost around \$30,000," he reveals. "We became the very first company to manufacture a 3D desktop scanner at a relatively low price point, and we've since sold more 3D scanners than any other 3D scanning company in the world."

They're not the only company performing well. In the past year alone, Volkov has seen Artec Group achieve a 250 per cent growth. Artec originally started up as a business based on research work in 3D facial recognition, but its main focus has shifted to hand-held, high-resolution 3D scanners. This is in addition to the company's recent development into software that makes the scanners work even more intuitively than ever before. Today, using Artec's Shapify.Me app means that anyone with a Kinect sensor in their living room can 3D scan themselves for free with no special skills required, which is a far cry from 3D scanning's expensive, strictly professional origins. Autodesk's 123D Catch App takes such simplicity even further, enabling users to capture and create 3D models for free from an iPhone, iPad, or even a web browser. Suddenly, a 3D camera becoming a normal part of daily is less of a daydream, and more a tangible reality.

But what could this mean for 3D artists? We rounded up six of the most prominent 3D scanning hardware and software solutions in use today to discover exactly what the technology is capable of, and where it might be headed in future...



Five tips for achieving the best 3D body scans

The ReconstructMe team reveals how anyone can achieve the best 3D scans possible

"Body scanning is a common task for ReconstructMe, and works very well," explains media manager Christoph Kopf. "Usually, two people are involved – one person who performs the scan, and the second person that will be scanned." He tells us that since ReconstructMe is – like most 3D scanning technology – designed only to scan static objects, one of the most important things to ensure is that the people being scanned do not move during the process. To further improve the results of your 3D body scan, the ReconstructMe team recommends following these five tips:

1. Have the sensor at least 50cm away from the scanned person. Point the sensor towards the person and avoid jerky movements
2. If possible, make sure that no other objects are close to the subject that you're trying to scan
3. Capture your whole subject by taking shots from as many views as possible
4. Avoid overexposure, which can be caused by highly reflective objects or direct sunlight
5. Reflective, transparent or very shiny objects such as mirrors, jewellery, metal objects and even hair will be a challenge to capture for many 3D scanners, if not impossible



The NextEngine 3D scanner in action, scanning highly detailed models of students' work at the High School of the Arts in Belgium. The scanner holds the title of the World's top selling 3D scanner



© The High School of the Arts - Antwerp/Belgium

■ 123D CATCH - FREE

With Autodesk representing one of the largest and most powerful corporations in the CG software industry, it's no surprise that it's explored how to incorporate 3D printing and scanning into its software for quite some time now.

Like the rest of the Autodesk 123D family of free apps, 123D Catch is extremely user-friendly and very easy to learn, as well as being completely free to use. The app effectively enables users to use their iPhones and iPads as 3D scanners without the need for any further hardware, thanks to a process called photogrammetry. Users can also prepare captured models for 3D printing using the 123D Catch web app. A free PC download of the software is also available to provide access to more advanced features for editing models or even creating animations, which can then be directly uploaded to YouTube and shared with the community.

For the best results, this app requires a loop of at least 20 sequential photographs to be shot in small increments around a subject from all angles. The process is explained to the user during the guided capture, which gives visual feedback throughout to ensure the best possible photographs are taken.

While some other scanners require user input to finalise the quality of the final scan, the 123D Catch pipeline strives to make the technical side of the process more automated, stitching all of the captured photos together automatically. However, users can still perfect any photos that weren't automatically stitched during the manual stitching process. The user can then view their object and clean the mesh details using the web app, ensuring the scan is ready for 3D printing. They can then send the model directly to a 3D printing service or to their own personal 3D printer, directly from the web browser.

3D scanning is absolutely changing the face of 3D modelling. If you want reality, then just grab it and spend your valuable time on other areas

John Mahoney, concept artist and designer

■ THE NEXTENGINE 3D SCANNER - \$2,995

"123D Catch is a free app that is actually equal or better than some of the 3D scanners that cost \$400 or \$1,000," reveals NextEngine's Gustafson, telling us that he is also impressed by the app's ability to scale from capturing large objects to relatively small ones. For him, 123D Catch is one of the better quality consumer options out there.

The NextEngine 3D scanner, however, is a different beast entirely. "Some of the scanners that are currently out there such as 123D Catch, the Sense and the MakerBot Digitizer - those are all consumer grade 3D scanners. Ours is more of a prosumer scanner. It's in the middle because it's \$3,000, but the closest competitor that we really have is priced somewhere around \$20,000. We compare closely in price to the consumer grade products, but they are nowhere near us in terms of performance. Our resolution is 0.1 millimetres. If you look at the 123D Catch, the Sense and the MakerBot they're right around anywhere from one to two millimetres."

As the world's highest selling 3D scanner, NextEngine's high-tech solution uses the company's own proprietary software and an array of lasers to scan in parallel for increased data fidelity, with resulting scans output as STL, OBJ, VRML, XYZ, and PLY files for a multitude of different professional workflows. Though the scanner already boasts an

impressively high resolution, users also have a great deal of control over the resulting model thanks to an ability to carefully edit any discrepancies. "Our workflow is scan, align, trim, fuse," Gustafson explains. "The process is that you take multiple scans, you align the scans together, you trim out the data that you do not want, and then you fuse. If you have a face that's curved and you're scanning it from a different angle, as the face curves and falls away from the receiver of the scanner you can get what we call elongated triangles. These triangles are less accurate than the normal uniform small triangles. Then if you rotate the object slightly and take another scan, this new scan will have elongated triangles, but they'll be in another place because this other location is falling away from the scanner instead. With our scanner, you are able to go into the individual scans and trim those away, so when you align multiple scans together you get crisp, clean data. Other scanners make assumptions with calculations such as this, and the result is a loss in overall quality."

NextEngine oversees the whole of the design, manufacturing and distribution process for its scanner, with thousands of clients in over 80 countries worldwide. The company currently sells to a variety of technically minded customers for a range of varied uses, which can include anything from design to entertainment, manufacturing, medical, and scientific applications.

3D scanning

■ SENSE 3D SCANNER – \$399

Boasting the most versatile scan range in its class with auto-optimised settings for scanning objects in sizes from 0.35 to three metres, the 3D Systems Sense 3D Scanner aims to be as intuitive and easy-to-use as possible, while still scanning at 1mm depth resolution. The NextEngine 3D Scanner may be capable of scanning at a higher resolution, but the many options available to customise and perfect a scan can make the process feel altogether more complex and difficult.

The Sense 3D Scanning software aims to avoid this, catering even to those with the least technical knowledge. The scanner sets itself apart by asking very little of the user when carrying out a 3D scan, completing tasks such as intuitively filling in the gaps of any missed capture areas in an easy, tap-and-go process. The hardware design has also obviously been devised with usability in mind, being both ergonomic and easy to use as a hand-held, mobile device.

"The Sense is incredibly intuitive and works as a point-and-scan system. You have the option to adjust the settings to indicate if you are scanning an object or person to give the Sense an understanding

of scale, but that's the only work you must do," says Keith Ozar, director of marketing at 3D Systems. "It has an exceptionally easy workflow that's intended to be uncomplicated and expedite the scan and print process." Once touched up in the user-friendly Sense software interface, the scan is immediately 3D printable, or able to be exported into 3D design software for further modification.

■ ARTEC EVA – €13,700 OR €9,700 FOR EVA LITE

"Based on our observations, in 2013 we have sold 2.5 times more Evas than the previous year, and we have noticed that this growth is mainly due to the new usage of the scanners," say Artec Group's Leonid Volkov. "It's mainly because people can use the scanners for body scanning. There are already plenty of commercial print shops around the world where you can come in and get yourself fully scanned, and 80 per cent of these print shops actually use our Artec Eva as a solution."

Unlike other scanners, the Artec Eva 3D Scanner is more similar in design to a video camera, only it records its footage in 3D. The data is captured at up to 16 frames per second, with each frame then

automatically aligned in real-time to make the scanning process fast, easy and efficient. The Artec Eva also doesn't require markers or calibration, capturing objects in colour with a 3D resolution of up to 0.5mm and a 3D point accuracy of up to 0.1mm. Once the object is scanned, users can align multiple scans together using Artec's optimisations algorithm or place the model to the origin of a coordinate system, then fuse the scans together using the company's Fusion algorithm.

A cheaper version of the scanner, the Eva Lite, can be bought for €9,700, which is similar to the Eva in every way aside from the fact that it cannot capture textures. An upgrade in Artec's online store will then give users the option to turn on the texture function if they so wish.

With 3D scanning reaching more consumers, however, the Artec Group has also developed cheaper scanning solutions such as Shapify.Me, a piece of software that enables users to 3D scan themselves at home with a Microsoft Kinect. Unfortunately the scans cannot be saved on computers right now, but figurines can be 3D printed and delivered to the user's address within five days at a fixed price of \$79.

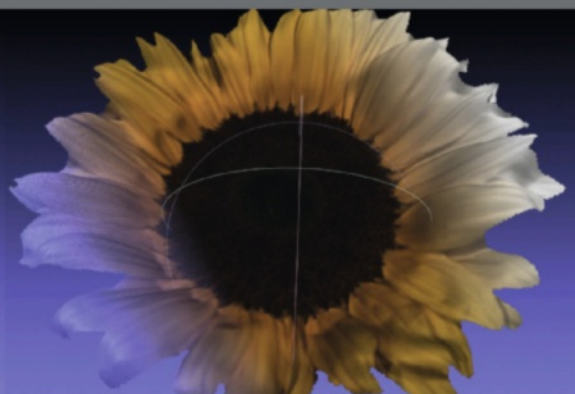
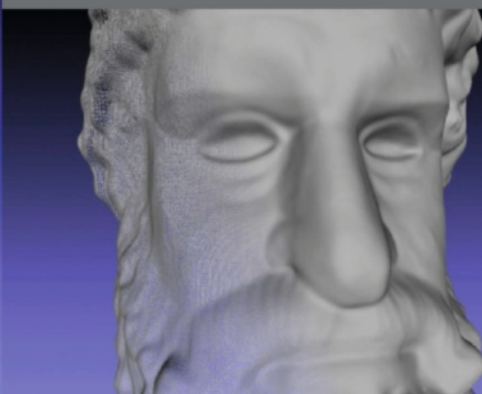
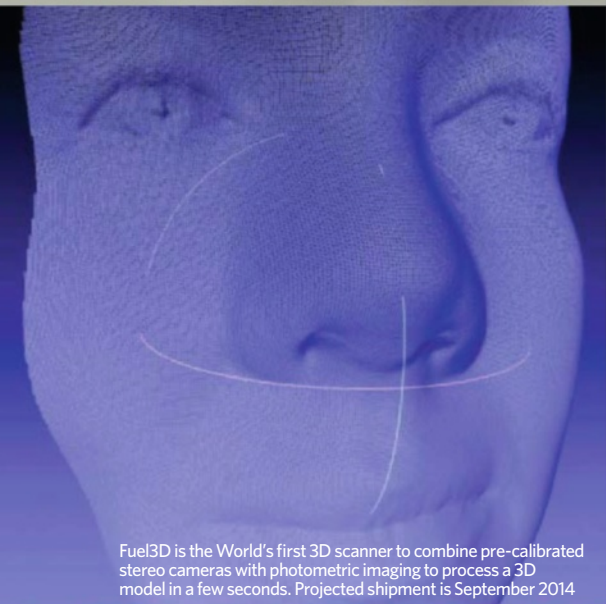
Fuel3D unveiled the first images of the final hardware design in January as it prepared to exhibit at the 3D Printer World Expo



The MakerBot Digitizer Desktop 3D Scanner creates a digital 3D model of a physical object by taking a rapid sequence of pictures as the object rotates on the turntable



Fuel3D is the World's first 3D scanner to combine pre-calibrated stereo cameras with photometric imaging to process a 3D model in a few seconds. Projected shipment is September 2014



■ FUEL3D – \$1250 ADVANCED ORDER OR \$1500 PLANNED LIST PRICE

Fuel3D raised over \$300,000 in a highly successful Kickstarter campaign last year, seeking to make their affordable, hand-held 3D scanner concept a reality. This year, the company has revealed a new hardware design for the Fuel3D scanner and has made it available to pre-order from \$1250. Like the NextEngine 3D Scanner, Fuel3D has said that its scanner represents a new price point in high-end hand held 3D scanning technology, with direct competitors typically retailing for \$15,000 or above.

Notably, it is the world's first 3D scanner to use a combination of pre-calibrated cameras with photometric imaging. This enables the Fuel3D to be capable of capturing and processing a 3D model in seconds without the need to take multiple photos, making it literally a point-and-shoot solution. If objects need to be acquired from more than a single viewpoint, however, such as a whole human head, multiple shots and third party software will be required to stitch the shots together.

"The Fuel3D scanner shoots a single 3D image of the subject using multiple separate lenses that record the photo colours and also records some three dimensional information – the same way we use our binocular vision to see the world in 3D," explains John Mahoney, a concept artist with experience working as a designer for Disney, who uses Fuel3D in his work. "I just import the file and clean it up a bit, then attach the piece of geometry to an existing model and there you go. If I have to do multiple views and stitch them together later, this is a more complicated process, but one POV shot works great, such as scanning a person's face."

Such an easy method of creating high-res, colour 3D models is certainly intriguing, and will certainly come in useful when creating personalised videogame avatars, for instance. However, there's more to the Fuel3D than just customisable faces. With one click, the scanner software incorporates proprietary algorithms to combine the data from its photometric and geometric 3D imaging systems to produce a single 3D model that is both accurate and has high-resolution of surface detail. In essence, the high-accuracy, low-resolution geometric 3D data is

used as a skeleton on which the higher resolution photometric 3D data is overlaid. The resulting 3D images consist of a large several hundred thousand samples, as well as colour in 8-bit RGB. It's truly impressive stuff.

■ MAKERBOT DIGITIZER DESKTOP 3D SCANNER – \$949

Much like MakerBot's current crop of 3D printers, the Digitizer is set apart from the typical 3D scanner by its totally uncomplicated ease-of-use. Optimised to work seamlessly with MakerBot's hugely successful MakerBot Replicator Desktop 3D Printer, the Digitizer scans objects on a turntable using two lasers and a camera, resulting in a watertight 3D model without any need for the user to have previous design or 3D software experience. After the scan, the MakerWare for Digitizer software included in the purchase can automatically create the mesh in seconds – a solution that means the user can jump straight into their creative process without the need to patch, stitch, or repair their mesh. The Digitizer's scans are more limited than those of other scanners, however, as it is only able stretch to 8" in diameter and 8" tall, with a maximum weight limit of 3kg.

"We focused on making the MakerBot Digitizer super easy to use, intuitive and simple," notes MakerBot CEO Bre Pettis. "The Digitizer is powered by the MakerBot MakerWare software, and in the future we're planning on offering additional software updates that are expected to add even more features and capabilities."

Once scanned, the Digitizer produces 3D models that contain approximately 20,000 triangles with details captured at up to 0.5mm. It has been designed as the ultimate consumer product, users going from a scan to a 3D print in a matter of minutes. "We're really excited about the MakerBot Digitizer," Pettis continues. "This is another innovative product for visionaries, experimenters and creative hobbyists. Not only those, but educators, 3D sculptors and designers will benefit from it. Basically anyone who wants to be the first to become an expert in Desktop 3D Scanning." Users can also output the model as an STL file for further customisation in 3D sculpting software.

The technology still requires a lot of optimisation, but in a couple of years it will be fully automatic, very affordable and widely available

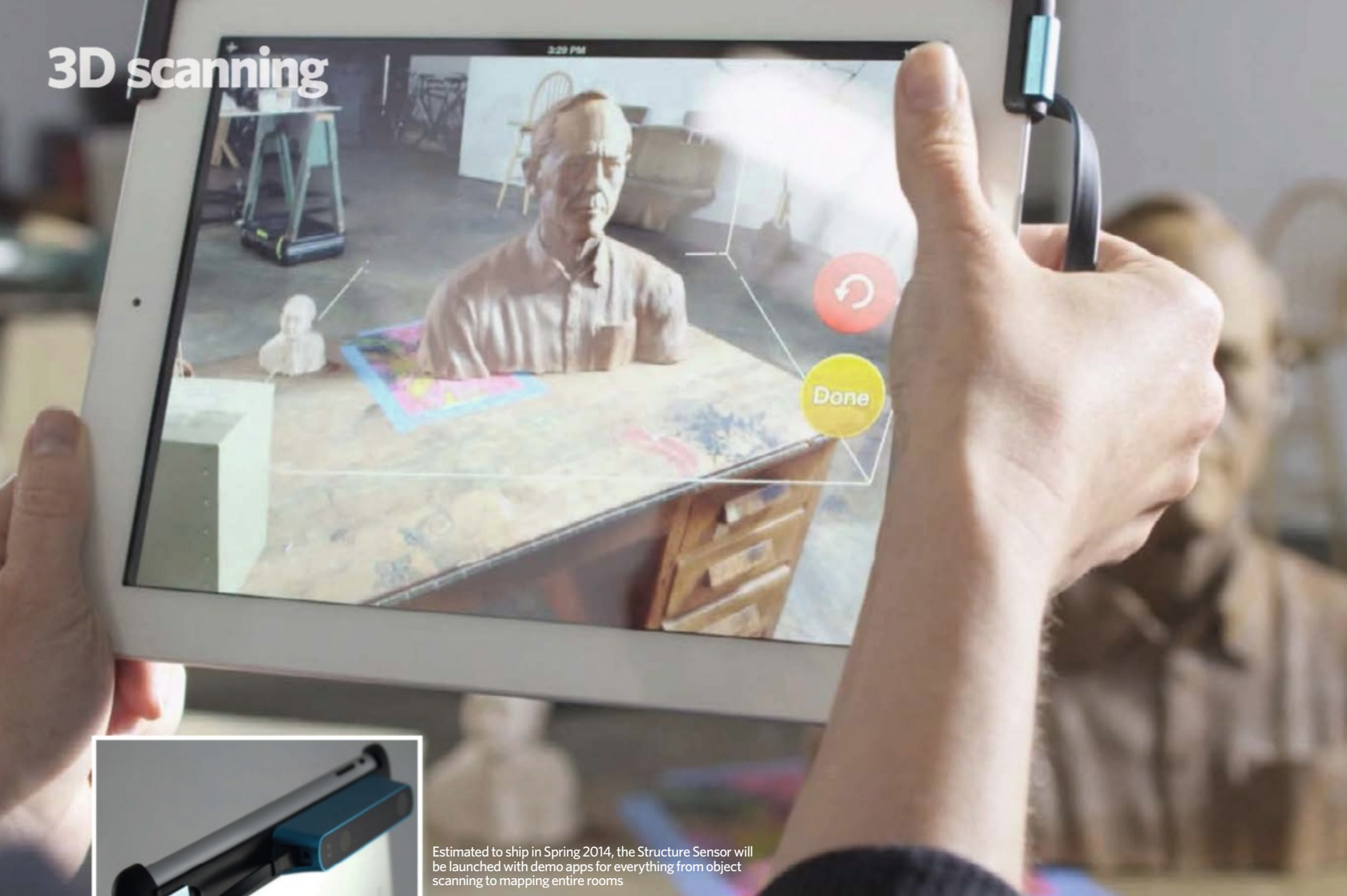
Leonid Volkov, chief business development officer at Artec Group



The Artec Eva 3D scanner doesn't require markers or calibration, capturing objects with a 3D resolution of 0.5mm and a 3D point accuracy of up to 0.1mm



3D scanning



Estimated to ship in Spring 2014, the Structure Sensor will be launched with demo apps for everything from object scanning to mapping entire rooms

THE 3D REVOLUTION

"A lot of people say that 3D is actually more of a transformation to society than the Internet, and I believe that it's actually so," states Volkov. The past year has marked a considerable turning point, with even those who have no previous experience with 3D technology now able to produce and print details 3D models. It's no wonder that some professional artists are a little wary of the change.

"3D scanning is absolutely changing the face of 3D modelling," says Mahoney. "Real world material is tricky to reproduce, so why reinvent the wheel? If you want reality, then just grab it and spend your valuable time on other areas."

He explains that for him, the introduction of 3D scanning technology is the present-day equivalent of cameras replacing realistic portrait painting in the 19th century. "There is still a craft for this type of work, but what is the final goal?", he asks. "Some people find this stuff kind of scary and in some ways I do too, but it's also very exhilarating. Adapting can be difficult, but I know that if I hide from all of this, there is a distinct chance that I will be left behind, both financially and creatively. It's also worth noting that all of this new technology has not yet stopped me from drawing and sculpting by using traditional methods."

Whatever your thoughts on the matter, the ability to 3D scan and print your own souvenir using just a smartphone isn't likely to be the only way our lives could change. There are so many exciting applications for the technology, from simple entertainment through to real practical uses, that it boggles the mind. "You can only dream about the variety of applications that will be available," says Volkov. "Imagine using your 3D model to virtually try on any garment to see if whether it fits you or not, or being able to 3D scan, modify and print your own customised jewellery, or playing a video game with an animated version of yourself."

"I think that the number of opportunities is so large that the impact will be great," he concludes. "It might end up taking a lot more time, but I can't wait to jump into this 3D revolution."

Everyone will have a 3D camera just to capture those special moments in our lives with such an unprecedented quality – so much better than now

Leonid Volkov, Chief business development officer at Artec Group

The 3D Sensor

"The Structure Sensor is not just a 3D scanner," says Adam Rodnitzky, director of marketing at Occipital. "It's a platform that enables an entirely new set of apps that use mobile 3D sensing as their foundation, with object scanning being one of them." As the first 3D sensor to ever be created for mobile devices, the Structure Sensor uses structured light to project a laser generated pattern on the objects and environments in front of it, and then records the shift in that pattern to understand the three dimensional geometry of those objects and environments. Estimated to ship in spring 2014, the sensor will be launched with demo apps for everything from object scanning to room mapping. Other apps will also feature the ability to experience augmented reality gaming, with the sensor featuring open source drivers for multiple platforms to enable programmers to develop apps that make use of the technology.



Many consider the 3D revolution to have transformed society more profoundly than the internet, particularly now that it's becoming increasingly accessible

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INVISIBLE VFX

THE ART OF CONCEALING CG

LUCY AINSWORTH-TAYLOR
VFX producer/MD
Company BlueBolt



ERAN DINOUR
VFX supervisor
Company Brainstorm Digital



JOE FARRELL
VFX supervisor
Company Scanline VFX



MARKO FORKER
VFX supervisor
Company Method NYC



ADAM ROWLAND
VFX supervisor
Company Nvizible



Paul Hellard takes a look at how VFX studios create the invisible effects we're never meant to notice

In an industry racing to show ever more spectacular, out-of-this-world VFX, there is a beautiful body of work being produced by many studios in top billed films, none of which has been created to be noticed. In fact, if any of this work is noticed at all it's seen as a failure. These invisible visual effects are meant to pass unseen by the viewing public, discreetly woven into the

narrative of the film and appearing as if they were actually shot on set.

Surprisingly, these secret VFX shots can often be more difficult to create than those featuring spaceships or monsters. We spoke to several VFX supervisors in charge of these seamless marvels to discover how invisible effects are achieved and the challenge that creating them entails.



The Wolf Of Wall Street: WORK ON THE YACHT

The 170-foot yacht in Martin Scorsese's greed-filled epic was created by Scanline VFX for the tumultuous ocean sequence. "If you ever have a good look at these mega-yachts, they look quite fake in real life," explains VFX supervisor Joe Farrell. "This in itself was a big issue because obviously we want everything to look as real as possible, but when the real thing looks fake, you know you have a problem."

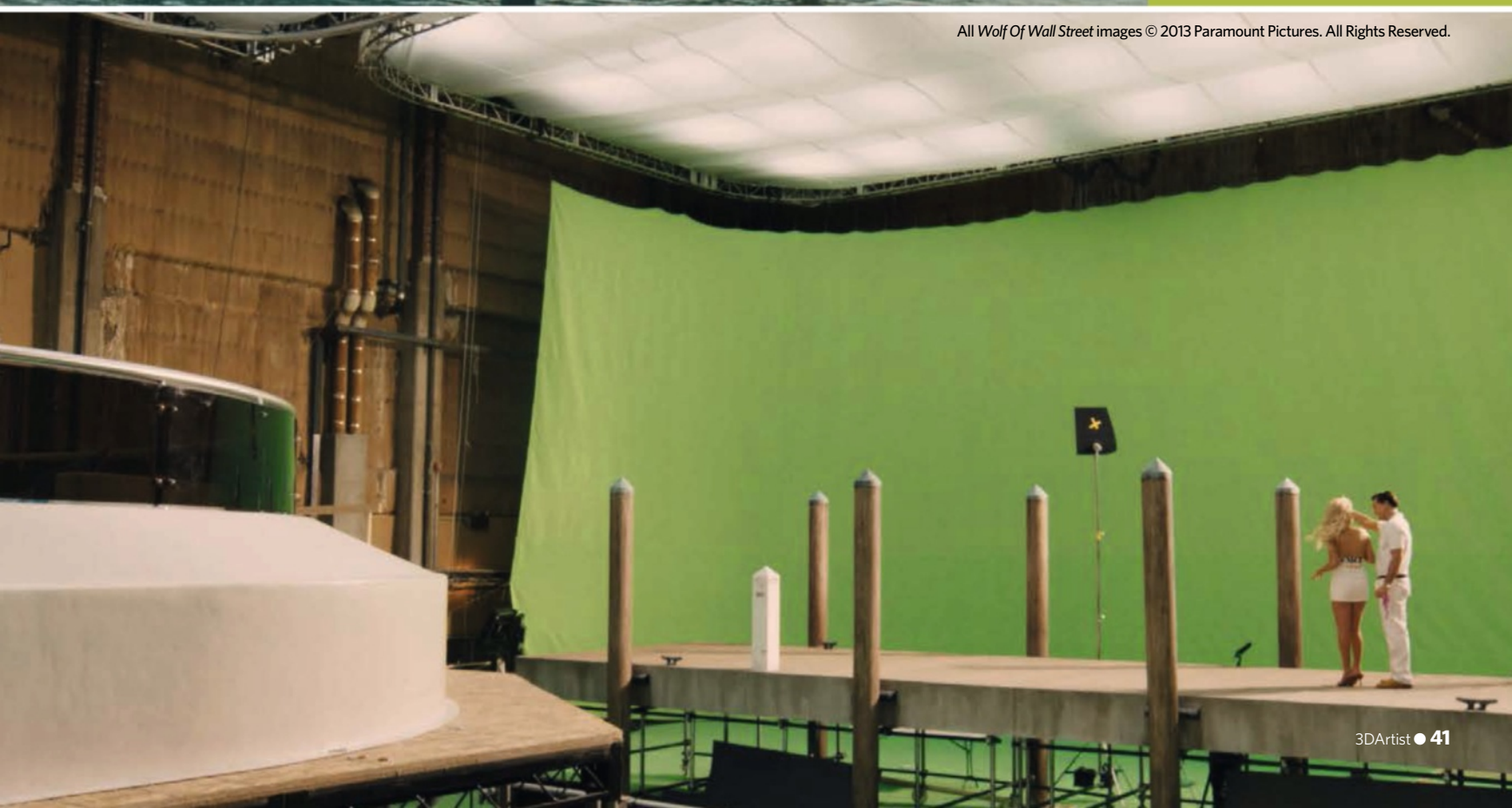
Scanline VFX found it had to dig down into the surface of this wax-coated yacht to invent details that it knew would almost never be seen. These included the deepest levels of texture detail and shading and details such as rippling reflections in even the tiniest areas. It was careful compositing that helped sell the final effect. "We had some master artists compositing that sequence to make it all come together," says Farrell. "That was key to making the CG yacht invisibly real."

To view the Scanline VFX Wolf reel go to www.tinyurl.com/TDAScanlineWolf

PLATE (below) For these shots, a portion of the yacht was built with the remainder green screened. This gave vendor Method NYC license to create an Italian harbour vista for the background plates.

FINAL (left) Method NYC created the full length yacht, the multi-storey harbour environment, water, a few other boats and a solid lighting angle. Few watching the film would realise that at this point that the only real elements they're seeing are the actors and the jetty.

All Wolf Of Wall Street images © 2013 Paramount Pictures. All Rights Reserved.



The Wolf Of Wall Street: APPROACH TO THE PARTY HOUSE

The house was right but the location needed to change

Top:

FINAL The house surroundings were cut back to brighten the environment and to give a more exclusive feel to the party. The sky, the time of day and the colour grading were all altered. Extra houses were also added to give the sense that this is an high-class neighbourhood befitting of Jordan Belfort's expensive taste.

Bottom:

PLATE Here you can see the original setting with the house, the partying cast and the film crew at the sides. The Brooklyn lakeside surrounds were densely surrounded by foliage – the whole lot had to go.

FINAL

PLATE

THE WOLF OF WALL STREET

Martin Scorsese's latest brings the wild stock market exploits of Jordan Belfort to the big screen – a difficult task in and of itself. However, the invisible VFX needed to bring this tale of over-indulgence to life presented plenty of challenges too. Marty's friend Rob Legato was asked to join up as the overall VFX supervisor on this vibrant rollercoaster of a film.

Previously Legato and Scorsese had teamed up on *Hugo*, which was awarded an Academy Award in 2012 for Best Visual Effects. Although *Hugo* was filled with resplendent CG, Legato's collaboration prior to that – *The Aviator* in 2004 – contained more discreet VFX hidden away from the human eye. It was this approach to concealed effects that Legato once again needed to bring to the fore in the telling of *The Wolf Of Wall Street*. Several vendors were brought in to help bring Scorsese's vision to life.

BRAINSTORM DIGITAL

Eran Dinour, VFX supervisor at Brainstorm Digital, supervised around 100 shots for *The Wolf Of Wall Street*. Many required far more green screen work, matte painting, compositing and grading than he'd previously taken on, with every single one of them having to be carefully crafted to appear as if absolutely no work had been done on the original plates whatsoever.

"One of the most intricate in the line-up for us was a prison tennis court set-up, which ended up being so much more than we planned," explains

Dinour. "Shot on a crane as a slow track back, the shot reveals that the tennis court is actually in a low security prison."

The tennis court itself was in Brooklyn, while everything else in the scene was shot on a sound stage in California. The idea was to extend the view to take in the surrounding grounds. "As well as the many parts of the scene requiring matching, at a later stage Scorsese felt the shot was too slow," Dinour explains. "This was the real footage, and not the extended shot with the composites. There were other tennis players, people on the roof, weightlifters and suchlike. We rotoscoped DeCaprio, his tennis partner and a couple of people moving around in the background."

Legato had other tennis players filmed on green screen, who acted out the necessary actions and could be composited in later. "We re-created the entire tennis court, replacing all the surrounding elements with matte paintings, so we could move the camera freely and at whatever speed we wanted," concludes Dinour.

HIDING IN PLAIN SIGHT

Brainstorm Digital also shot an aerial approach to a wedding party at Belfort's lake house in Brooklyn. While the actual locale had a practical pool and several palm trees in the setting, they were cut out of the shot and a Caribbean island beach environment was introduced instead. "The establishing shot for us was a house on an island as

seen from a boat," says Dinour. "We had to add a lot of elements to make it look like the party was actually happening there. We had to change the sky, the time of day and the overall colour grade. It ended up looking completely seamless."

"I like the term Invisible VFX because I like to think that's what we do," continues Dinour. "These aren't the kind of effects that people go to the cinema to say, 'wow, look at that'. Usually they don't even notice. There's a lot of colour grading to make these elements look like they're in the same space."

Brainstorm Digital has re-created many historical urban environments in other productions using similar techniques. The studio won an Emmy for previous projects, such as television series *Boardwalk Empire: Season 1 and 2* for HBO.

Boardwalk Empire is particularly notable for the re-creation of the famous Atlantic City pier and the authentic building surroundings witnessed in those shots. Another feature production including work from Brainstorm Digital currently playing around Europe is *The Immigrant*, which is set in 1920s New York City. "There are many other places in *The Immigrant* that don't exist anymore, or look completely different from their appearance in the 20s," says Dinour. "The effects here are, of course, invisible, not fantastical. These shots are particularly difficult to do because they are supposed to be invisible. They're there to support the narrative – not to draw attention to themselves, as in other VFX-heavy productions."



The Wolf Of Wall Street: **TENNIS COURT SHOT**

How Brainstorm Digital sped up the giant aerial tennis court reveal shot without causing the players to move in fast motion

Top:

PLATE The individual players on each court needed to be isolated, with the correct duration of play created

Middle:

DEUCE The plates of the surrounding properties were then brought in, with the set extended to display a wider location

Bottom:

MATCH POINT The final plate displayed the courts, the surrounding locations and tennis playing at the correct speed as the trackback rolls out at a faster rate



Invisible VFX

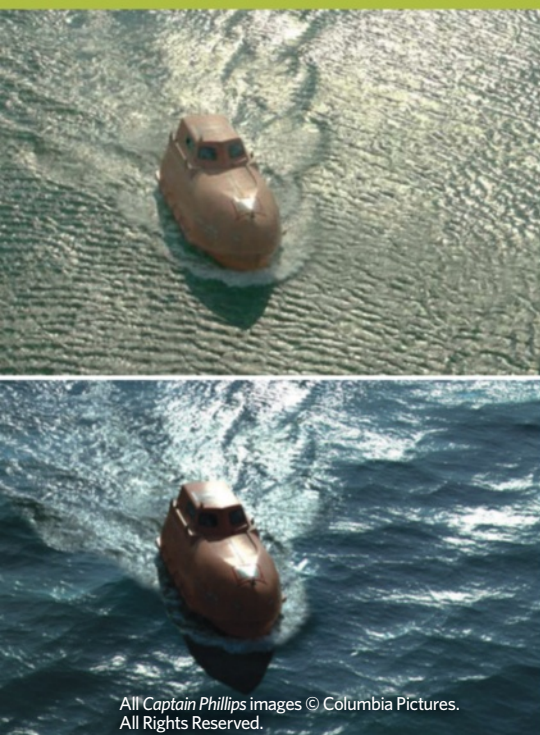
Boardwalk Empire:

How television can create the past using extensive blue screen matte painting

BLUE DAYS In this extensive establishing shot everything was replaced, right from one end of the pier to the other



PERIOD REPLACEMENT Everything from the beach to the people and the sunshine are matted in



Captain Phillips:

SEA CHANGE Even the entire sea surface can be changed, as evident in the final shot (bottom)

THE METHOD ON WALL STREET

Marko Forker has always been enthralled with the VFX that cannot be seen. A veteran of Digital Domain on epic feature films such as *Charlie And The Chocolate Factory* and the magnificent *Peter Pan*, Forker has gone on to work as a VFX supervisor on *Silver Linings Playbook* and now *The Wolf Of Wall Street* with Method NYC.

Method NYC worked on 73 shots in *The Wolf Of Wall Street*, with one particular sequence set on an Italian harbour containing over 100 discreet elements. "I come from a photographic background, interested in putting big and beautiful images up on the screen," Forker explains. "I'm interested in the jobs that re-create a reality that doesn't make people shudder in their seat because they realise that they've just seen a visual effect."

At first, the Italy shot seemingly required only a simple green screen, but was made more complicated by numerous handheld camera jitters, a few focus pulls, and an anamorphic lens squeeze that would stretch the plate on a particularly sharp focal length pull. The camera had to be applied using an animated grid-warp instead of a standard lens-distortion model, and Method NYC had to re-create the sense of depth to make sure the focus on the water around the boat was travelling in unison with the foreground. They then needed to seamlessly apply the same effect to the yacht CG extension and the helicopter on the back deck.

Achieving the big moves was less of a problem than getting those tiny motions to lock, and Method NYC took extra steps to make everything feel like they weren't VFX shots at all. The tracking of the camera motion covered more than a 100-degree angle. Method NYC's intent was to avoid additional painting work due to time constraints, so it ended up implementing some relatively obscure compositing practices to solve the edges and hair detail and change the lighting on actors when needed.

NATURAL MOTION AND REALISTIC LIGHTING

"The camera is moving and a lot of the time it's the VFX crew's job to gather extra elements and make them work together," says Forker. "These included a mass of background plates taken from a number of vantage points and angles, in this case of Italian harbours. Thankfully it wasn't created to resemble a particular Italian harbour, just to build a pleasing harbour view. This meant gathering and combining many background plates from many locations. There were examples where a mix of two locations made for a better fit for the sense of realism and the lighting and perspective. It's all to support the momentum of the story and not to showcase any compositing or matte painting prowess. Invisible VFX is a selfless endeavour because you're trying to remain completely unnoticed.

"In this case the trick was to replicate the photographic conditions of having the camera at a particular angle to the sun," continues Forker. "We needed to ask ourselves what focus settings, aperture points and other photographic conditions

needed to be re-created so the scene stayed looking completely real." While filming the scene from an actual yacht may seem the easier option, issues such as weather, travel, scale, sound and lighting conditions can cause a multitude of issues. Filming in front of a green screen on a replica of one deck of the yacht means these challenges can be avoided.

SCANLINE ON THE WALL STREET OCEAN

The main action sequence in *The Wolf of Wall Street*, awarded to Scanline VFX, is of the yacht at sea amid a violent storm. The facility has quite a reputation for believable water action using its proprietary solving software, Flowline. The *Iron Man 3* sequence of the Malibu homestead rolling off the cliff and down into the ocean is most notable.

"Rob Legato said he wanted to tackle the yacht in a storm sequence from a story point of view," explains Scanline's VFX supervisor, Joe Farrell. Scanline soon began work on pre-visualising the action on the yacht bridge, while actors at Universal Studios started working on the mo-cap. "That resultant motion capture was cleaned up, brought into the pre-vis and approved to be used as a guide to what goes on in the shot," continues Farrell.

Scanline VFX also created the extremely stormy ocean surface and captured the CG yacht's reaction to the movement occurring in the base waves. "We would do rogue wave animation and customise everything, key-framing the base mesh to gather the story-beats. Then we'd add the various strengths of simulations of the ocean surface water, bringing together and building on the many, many layers as we went. We can customise the Flowline software depending on the job – and every job is different. It's quite flexible with what we do with it."

When Scanline was collecting the wide shots of the bridge on stage, one of the challenges was making the camera's point of view feel believable. The yacht's bridge rocks backwards and forwards in the frothing ocean, which needed to be mirrored in the camera movement. "We found that without the camera moving at all, it looked very odd indeed," remembers Farrell. "What we did was take the inverse of that, so the camera was moving wildly around instead. But that didn't look right either. So, we took those virtual camera settings and fed it back into the set-up, so both the yacht and the camera were believably in the same sea, experiencing the same stormy ocean action and movements. It made all the difference and the scene felt more real."

MANDELA: LONG WALK TO FREEDOM

Meanwhile, a small company in London has dealt out some magnificent invisible VFX in the recent dramatisation of the life of South Africa's former president. BlueBolt specialised in VFX environments and was the sole VFX vendor on *Mandela: Long Walk to Freedom*. The work it does with directors is most often in blending digital extensions seamlessly into the shot plates. "When the CG is invisible it gives directors the opportunity to extend and exaggerate

their visual world without the restrictions of what can be physically shot,” explains Lucy Ainsworth-Taylor, the VFX producer and managing director of BlueBolt. BlueBolt’s prowess in the creation of unseen VFX was used to patch in vast crowds to otherwise unpopulated scenes (see right) or create set extensions of period townships.

Another use of BlueBolt’s talent was to fix physical prosthetic issues that were encountered on set. “Fixing prosthetics is time-consuming work on-set and can be laborious because of how much the actors will move in a shot,” Ainsworth-Taylor explains. “In *Cloud Atlas* some characters we fixed required their heads to be roto-animated, so it’s not always a case of simply painting something out. In *Long Walk to Freedom* we did several hundred shots of prosthetic fixes on the ageing Nelson and Winnie Mandela. Using animated models, we were able to project the painted textures of his new skin. Finally this was composited with the main plate.”

The BlueBolt 3D team primarily used Maya and Photoshop for blending the layered edges, and the 2D team used NUKE. The shots were then rendered using Solid Angle’s Arnold renderer.



All Mandela: Long Walk to Freedom images
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Mandela: Long Walk to Freedom POPULATING SCENES

To populate the scene, protestors were patched in to build a crowd

Top:

LIMITED CAPACITY Only a relatively small number of demonstrators were initially filmed for the scene

Bottom:

CROWD CONTROL Both the BlueBolt 2D and 3D teams then carefully composited protestors into the scene to create a convincing crowd

The Wolf Of Wall Street: ITALIAN HARBOUR AND YACHT

Inside for outside

MEETING Shooting this in studio allowed the lighting, sound and weather to be completely controlled

FINAL Bringing the party together for a meeting

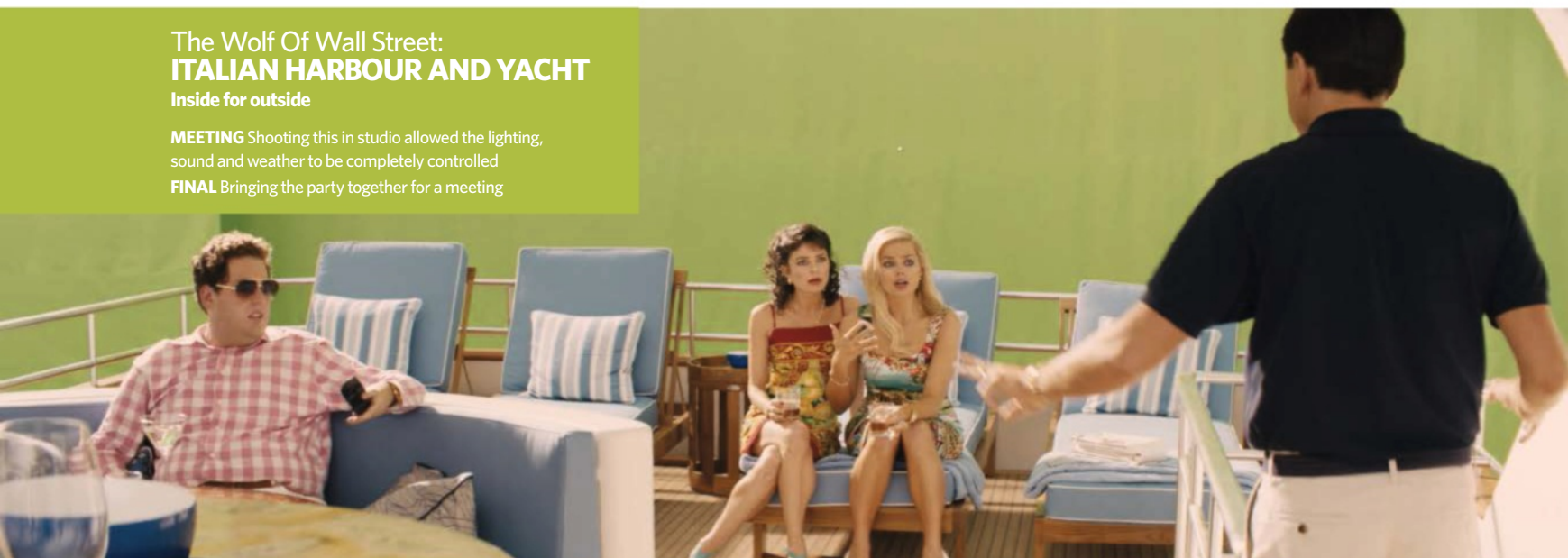




PLATE This scene was initially devoid of any signs of life, the aircraft carrier seemingly abandoned



FINAL Helicopters and personnel were added on deck, and the lighting and entire sea surface were replaced

CAPTAIN PHILLIPS - ONE FINE DAY ON THE OCEAN

Based on the true story of Captain Richard Phillips, this tense Paul Greengrass drama recounts the story of a merchant ship hijacked by Somali pirates. The main challenges came in the re-creation of a working harbour full of containers and huge forklifts, as well as the replacement of the sky, ocean and almost everything else in a sea shot – all while keeping the work entirely invisible to the viewer.

Adam Rowland was VFX supervisor at Nvibile for its work on *Captain Phillips*. The vendor's work began with a simple wire cleanup in a shot that included Tom Hanks jumping into the sea and the challenge only progressed from there.

One of the greatest achievements was in the recreation of a range of military hardware and navy personnel populating the deck of an otherwise empty aircraft carrier and airfield. "We did a sequence when the Navy Seals are leaving an airfield," explains Rowland. "We repopulated the airfield with a bit of life, adding trucks and helicopters and planes landing in the background.

"Most of the work was done in 2D, with NUKE working nicely as our compositing package of choice," continues Rowland. "When there were 3D objects like planes, they were all done in Maya. In the airfield sequence they wanted a Hercules plane landing, some helicopters and a Humvee driving around, and these were assets that were fairly easy to put together. Fortunately, none of it was very close up so we were able to get away without having too much detail. In a sequence such as this, the trick is to just make sure that the VFX elements don't draw the eye. You think of them as just accessories rather than attractions, adding just enough to make it look like there are things going on and it's not just

deserted. As long as it adds to the story and doesn't detract from it, and it's all subconscious to the viewer, it works."

Nvibile also worked on most of the skydiving sequence, which saw the Navy Seals jumping out of a plane and hurtling towards the ground. While that sequence was actually shot for real on GoPro headcams, they were skydiving mostly over land at the time. The Nvibile crew was tasked with creating an environment that made it look as if they were skydiving over the sea.

"That was one of our trickier shots, as you can imagine," quips Rowland. The Nvibile crew was given the plates, shot from the GoPro cameras and several other angles from the ground. "This was shot late on a sunny day and they needed it to be a night shot. We very quickly figured out that it was going to be much more time-efficient and easy for us just to rebuild the whole thing."

Nvibile extracted the Navy Seals and tracked the required camera moves exactly. The team then built a sea and sky environment in Maya and threw the Seals into that environment. "Fortunately it was supposed to be happening at night so there wasn't a lot of clever lighting required, it was all quite flatly lit," explains Rowland. "It just looks like it's been shot in a totally different time of day in a different area." They used the splash from the original footage but apart from that, it was entirely CG.

"It's great for a company to have done work on something like this, because it's not a production you'd normally associate as having had a lot of visual effects," concludes Rowland on the nature of invisible CG work. "When you can say you did 180 shots on *Captain Phillips* and people go, 'what, where? What are you talking about?' Then you know you've done your job."

Captain Phillips: ADDING ATMOSPHERE

The carefully concealed work of Nvibile

GRADING Shots such as this, with the Navy Seals making their way towards the plane, were heavily graded to better integrate them into the atmosphere of the film



REPLACEMENTS Many radar screen graphics were replaced for the US Navy Seal office scenes



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Artist info

Alex Lanier
3DArtistOnline
 Username: Laniercreations
 Website
www.laniercreations.com
 Country USA
 Software used
 3ds Max, Photoshop

“I wanted to create the effect of the car exiting the Photoshop program before completely rendering. I rendered the car once with finished materials and once with the checkered opacity material, then combined the two models in Photoshop.”

Smart Objects 2 2013

The inspiration here came from a daydream I had while fooling around with the Smart Object features in Photoshop. I imagined myself walking away from my computer to get something to eat, and while I was gone the drawing on the screen, along with all of the Photoshop tools, came to life, wreaking havoc on my desk. I heard a noise and came back quickly. My desk looked completely normal, except for the paint bucket still bouncing around leaving paint drops everywhere. Daydreaming is how a lot of my inspiration for new projects comes about.



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Artist info



Mao Lin Liao

Personal portfolio site
www.knitandigital.nl

Country The Netherlands

Software used Maya, ZBrush, Arnold, Lightroom

Expertise Character modelling, textures, look development

Mind-blowing photorealism

Alex – Portrait of a Young Woman 2013

“ Learn how to create realistic portraits using ZBrush, Maya and Arnold ”

Mao Lin Liao lives and works in the Netherlands as a freelance character and look-development artist

Here we will discuss the various techniques that come in useful when creating a realistic female model. We will be using ZBrush not only for modelling, but also as a grooming tool for achieving photoreal hair.

When I first published this model I received many questions regarding my hair-grooming technique in ZBrush and Maya. I'll reveal my less straightforward approach of using ZBrush as a grooming tool, taking this into nHair in

Maya, and finally using Arnold to create beautiful hair renders. I will share my settings and presets so you can create your own realistic portraits. It's worth noting that a basic understanding of Maya and ZBrush is required.

Since this tutorial is about creating a still image, I will provide a workflow aimed at a non-animation pipeline. As a look-development artist it's important to be able to work fast and create multiple variations, so we'll tackle this in a similar manner.

Concept

Creating a realistic female portrait has always been at the top of my to-do list. It was modelled and textured in ZBrush and the hairs are FiberMeshes converted into Guide Curves for Maya's nHair. Rendering was completed in Arnold, which is really fast even when working with high-polygon meshes.





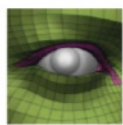
With the Disc

Tutorial files:

- Tutorial screenshots

Learn how to

- ✓ Sculpt skin details for extreme close-ups
- ✓ Paint realistic textures and efficient skin shader set-up
- ✓ Groom hair with the help of ZBrush FiberMesh
- ✓ Set up a realistic environment to render your ZBrush model



Model in ZBrush

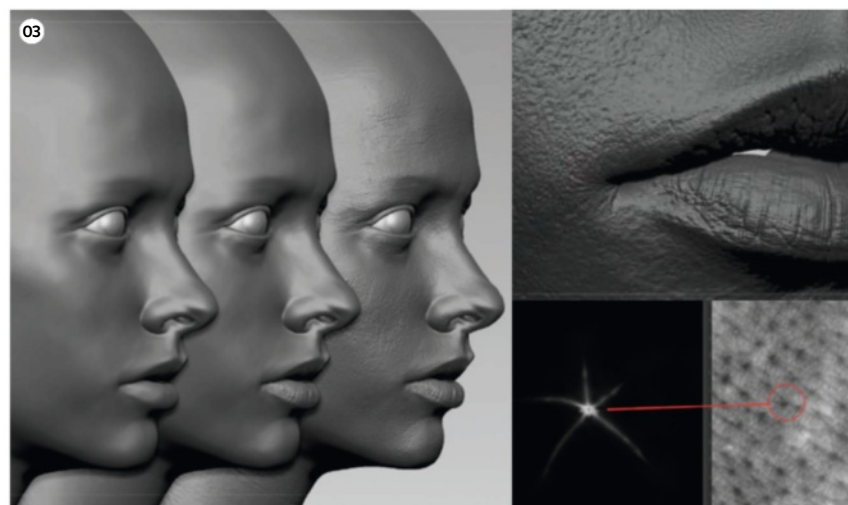
Create a base mesh then work on details in ZBrush

01 Prepare your model with UVLayout and Polygroup In order to work cleanly and precisely, it's important to have direct access to any areas that are normally difficult to isolate. Before adding details to your model ensure that you have the facial features like the nose, eyelid and lips separated to quickly isolate and work on the details. First prepare your model in Maya or another UV-unpacking software. Ensure that the UVs are not touching when they are adjacent to each other. This step is important when importing your .OBJ into ZBrush. Apply the Auto Groups with UV function to enable ZBrush to create Polygroups based on UV continuity. Now you're ready to sculpt without drawing masks to refine the sculpting area. This is not the final UV layout for texturing but a quick way to navigate through your mesh.



02 Camera distortion in ZBrush Before we start modelling our portrait, it's crucial to start with a good photo reference. Using this you can nail the proportions early on in the modelling stage. When using a photo reference keep in mind that photographers tend to take portrait pictures in a focal length between 85-200mm lenses. In order for us to match our photo reference we need to change our ZBrush camera to something that matches our reference. Default Field Of View is 50, which is equivalent to a 35mm lens, and should be adjusted to a value between 24-5. I highly recommend a Field Of View between 5-10, giving you the least perspective distortion.

03 Detail the skin There are three levels of detail to bear in mind when modelling complex shapes: low-frequency, which are relatively big shapes like the nose, eyelids and lips; medium frequency details, which are features such as wrinkles in your eyes and lips; and high-frequency details, such as skin details like pores and pimples. Start with a large brush size and gradually move to smaller brushes when working on the high-frequency details. I find artists often move on to the next frequency level too quickly when they should be concentrating on adding enough details to the lowest frequency. Try to avoid the use of large 2D skin stencils and rely on your hand-sculpted skills, especially when it comes to adding details like pores. It takes some practise, but the end result will be a more realistic look. Also keep in mind that SSS shaders blur away lots of fine detail. To maintain the skin surface details you need to exaggerate the depth or bumpiness of the skin pores in your sculpting.



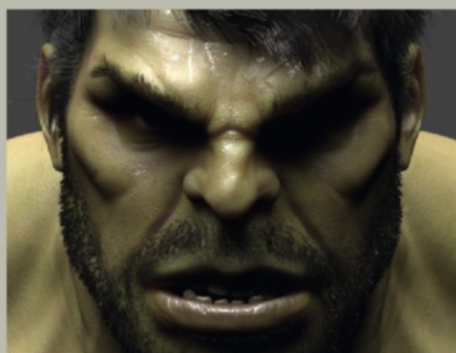
Using reference

No matter how well we light our model there is always a little specular contamination from lights that produce highlights on skin. This can never be completely removed in Photoshop. During my search for the perfect skin colour I found that pictures taken from people swimming underwater were the closest to a perfect diffuse texture with subsurface scattering. This really helped me to balance the skin tones and determine the SSS depth as described in step five. To improve your skin detail sculpting I recommend studying skin details. Sources such as www.surfacemimic.com can be very useful.

Artist Showcase

Mao Lin Liao

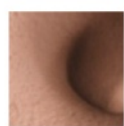
Mao Lin has been a professional 3D artist in the VFX industry since 2001, working as a production artist and supervisor. In 2010 he began operating as an independent contractor and formed his own company, Khitan Digital. He used to be a character artist at Guerrilla Games, senior artist at The Ambassadors and senior character artist at Triumph Studios.



Hulk Portrait Maya, ZBrush, Arnold (2011)
A personal interpretation of the Hulk.

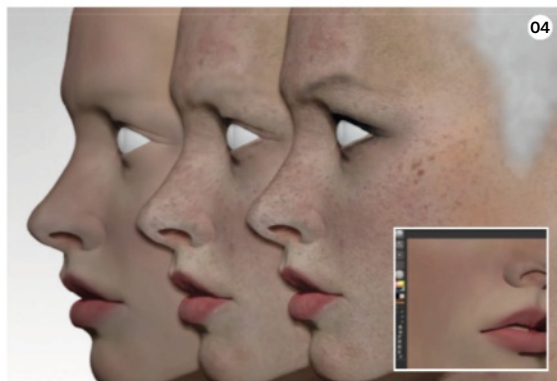


ISA Jammer Maya, mental ray, Photoshop (2009)
Female character for Killzone 3. This render was made for Guerrilla Games as a piece of marketing art



Skin shaders and textures

Find the right balance for skin tones and subsurface scattering



04 Texture using Polypaint Start blocking in the skin tones using a large brush with an RGB Intensity of 50. It's important to keep the overall look soft and blurry, so don't add details like make-up yet. This will be the last thing that we will apply. The next step is to add hue and saturation variations using the same palette. Use the Standard brush with Color Spray and Alpha47. Use the C hotkey to sample colours on your canvas and paint with a small radius. Finally, add small details like pimples and spots using the DragRect stroke and a simple circular or custom alpha.

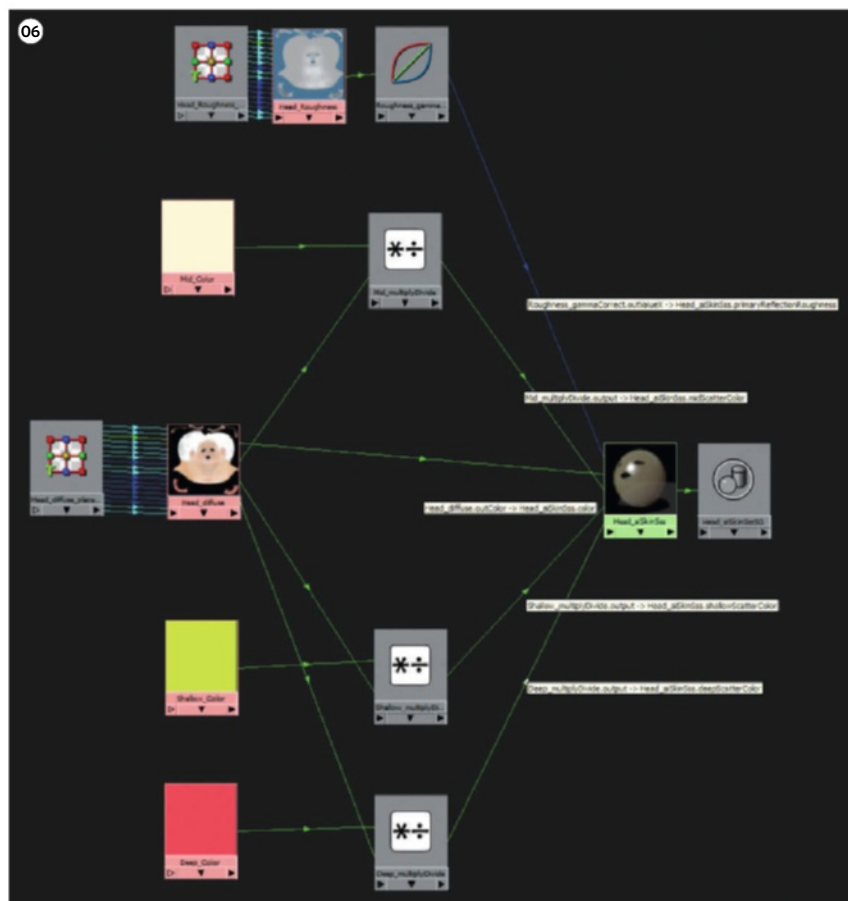
05 Arnold skin shader set-up The Arnold Skin Shader is an excellent skin shader. Like many render engines it works best with real-world units. I suggest starting with the default aiSkinSss and tweak the basic parameters like SSS Radius Multiplier to get the desired subsurface scattering effect. Changing this value can make a material look like anything, from marble to leather. At default this value is 10, which I found to be a little bit too waxy for my model. I tend to use a value of 5 for females and 4 for male characters.

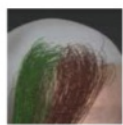


06 The fast three layer skin shader technique Using one Albedo Diffuse texture is enough for simple SSS shading, but to get more depth in your shading a three layer approach is required. Instead of using three unique textures to control the three skin layers - Shallow, Mid and Deep Scatter - I simplified the workflow and used just one albedo texture. One texture will multiply with the three colours that define Shallow, Mid and Deep Scatter. Use the Ramp texture in Maya to get a flat colour. The Multiply Divide node will help you mix the Ramp texture with your main albedo colour. This enables you to adjust layers without switching to an external painting program, and will save you a lot of time that could be lost swapping and saving between applications.



Helghast Hazmat Maya, mental ray, Photoshop (2009)
This is a Helghast Hazmat in an environment and it was created for Guerrilla Games as a marketing art.





Hair and grooming

Use ZBrush FiberMesh to design your character's haircut



07 Define the hair growth area To define the hair growth area Ctrl+drag will draw a mask when using the MaskPen and Lasso tool. You can do this by holding Ctrl and changing the default type of Dots into Lasso. Ctrl-clicking on the mask itself will blur it and provide a more natural transition from hair to scalp.

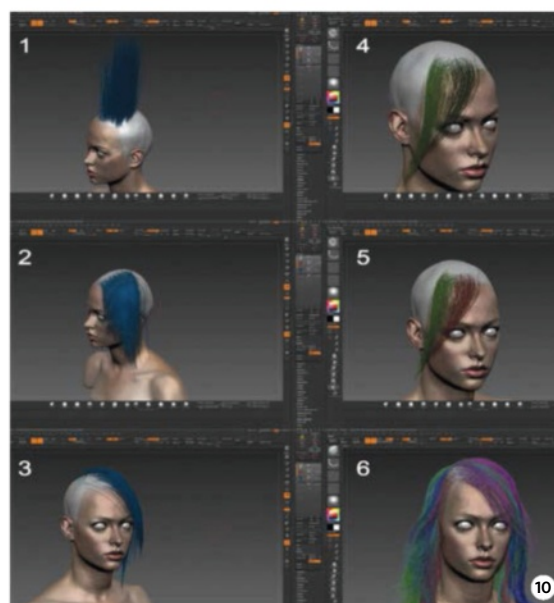
Changing the style

If you wish to alter the hair length, use the GroomLengthen Brush to drag the hair to your desired length. Decrease the length by using Smooth Brush. Hold Shift and paint on hair curves.

08 Grow FiberMesh Since FiberMesh is scale-dependent I recommend using my presets for an optimal start, which you can see in the accompanying image. It's important to have the hair orient upwards when you grow it, as this will prevent it from intersecting the face. Notice that I have given my hair profile a value of 1, as this will basically create hair without thickness. The reason for this is that I will only extract NURBS Curves from ZBrush to Maya. Higher values will only slow down the process. Keep in mind that we need to create long hair, so increase the Hair Segments to a fairly high number such as 32, which will provide enough control points. You can increase the length later in the process.



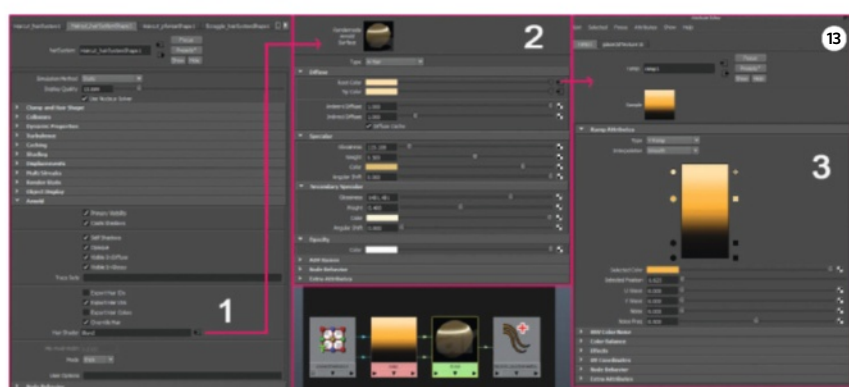
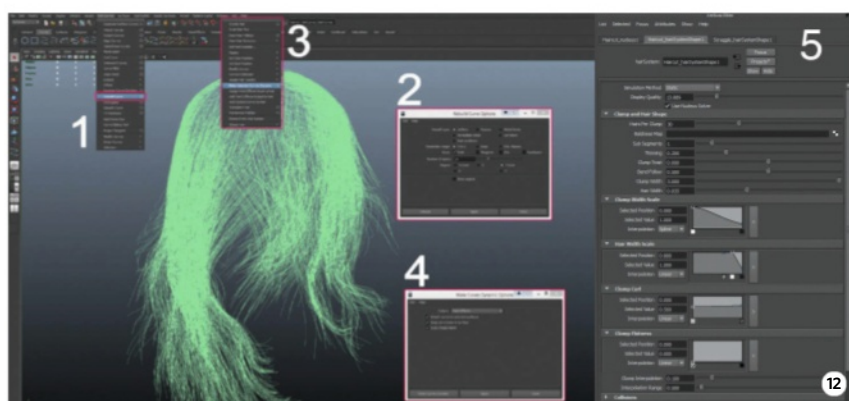
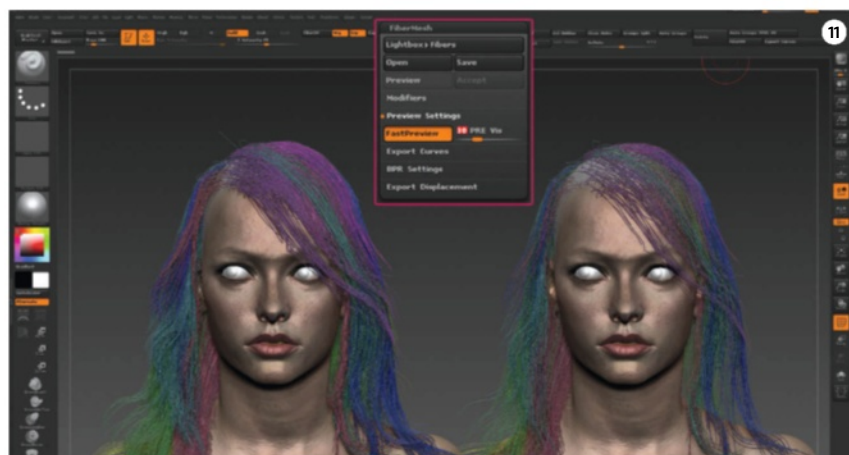
09 Organise your fibres with Polygroups In order to keep things organised we need to split the FiberMesh into clumps so we can easily select it later. Use Cmd/Ctrl+F to switch to PolyFrame mode. Ctrl-drag on half of the hairs to create a mask. Polygroup>Groups from Masking will create a Polygroup based on that mask. Try to work as symmetrically as possible and continue splitting everything into eight equal chunks as seen in the image above. Eight parts is a good start, though we can always add more when we need extra control.



10 Style and groom Now comes the fun part. Just follow these steps:

1. Isolate a hair clump by Ctrl+Shift+clicking on it. Start with the front two clumps.
2. Use GroomHairToss brush to comb down all the hairs.
3. Use GroomMagnet to make the clump drape in a more natural manner. Try to follow the head contour.
4. Ctrl+Shift-click outside your model to reveal the rest of your model. Repeat the first step for the rest of the clumps.
5. Feel free to add more clumps by repeating step nine.
6. To get the curly look we need to bend the groups. Instead of using the GroomSpiral tool - which does actually work well for a more extreme curly look - use the Move tool to bend and correct your overall shape.

11 Export to Maya Once you're happy with the look of your character's hair it's time to export your Curves to Maya. Select your FiberMesh tool and locate the Fast Preview Settings. Adjust the Percentage slider to decrease the number of output Curves to an acceptable density. I used 30% for my export. This number depends on how much detail you want to retain during export. Higher percentages will give you more detail and definition but will slow down your scene, while lower percentages will generate a more fuzzy look caused by the interpolation of the Guide Curves later in Maya. Click Export Curves to write a Maya ASCII .MA file.



Save time by using no displacement maps

In a normal animation production pipeline it's more than normal to export a low/medium resolution mesh for rigging, and then apply displacement maps for rendering. However, for look development and in-between render checks I recommend not using displacement maps for two reasons. One is that Arnold handles high polycounts very well. Alex's head model has 8 million polygons and it renders just as fast as regular meshes. By using displacement maps you're only adding even more render time since it loads a huge 4/8K file into memory. The second reason is that sometimes you need to change your model quite dramatically. This means that you need to update your low/medium resolution mesh to reflect the change, and this will require a rebake of the Displacement maps. That means two operations versus a single .OBJ export. Arnold is fast and reliable enough to allow for this.

12 Move to Maya nHair It's now time to integrate the ZBrush Curves as Guide Curves in Maya nHair.

1. Import the exported .MA file as NURBS Curves.
2. Rebuild the Curves (Surfaces>Edit Curves>Rebuild Curves) so they have an equal number of spans/vertex. This will create a smoother hair output.
3. Select all NURBS Curves and convert them to Guide Curves.
4. In the nHair menu select Make Curves Dynamic. Make sure the output is set to Paint Effects. This will generate the next three nodes – hairSystem1, nucleus1 and pfxHair1.
5. Adjust hairSystem1 settings. Set Simulation Method to Static to prevent any moving hairs during timeline scrubbing.

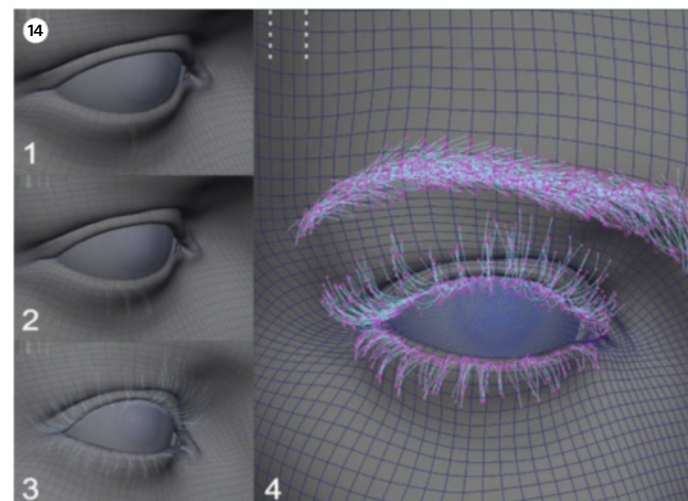
The Hairs Per Clump setting tells Maya how many hairs to generate per Guide Curve. However this is relative to the Hair Width. Thicker hair requires less hairs to cover the scalp, so start with 0.035. Thinning should be tweaked to avoid that typical perfect hair look.

13 Work on the hair shaders

1. In order to make the Arnold render Paint Effects hair, we must add an AiHair shader in Hypershade and link it to the Arnold section in the HairSystemShape node. Tick the Override Hair box to override the default Maya shader.
2. From the Hypershade window, drag and drop an Arnold shader (aiHairs) into the Hair Shader slot to make the connection. Set Hair Mode to Thick or Ribbon. I prefer to use the Thick mode as it offers slightly more detail in shaded areas.
3. Finally apply a Ramp texture to simulate the colourisation effect from root to tip.

14 Create eyebrows and lashes Although ZBrush offers great control over the process, I eventually went for the simpler but labour-intensive manual placement of the eyelashes. It sounds like more work than it actually is. Ultimately it's all about control.

1. Draw a NURBS Curve from a side view of your portrait. Copy it three times and randomise the position and rotation a bit.
2. Group the hairs into a cluster and reposition the pivot so it starts at the root of your hair cluster.
3. Duplicate the new group of Curves and try to place it along the eyelid. Repeat this step until the eyelid is filled with enough Curves. Try to align the root with the surface. The eyelashes may seem quite long but it's necessary to exaggerate because you'll need that length to apply hair thickness fall off later.
4. For the eyebrows I used the Maya Live Mode to draw Curves live on the surface, then copied it along the brow area.

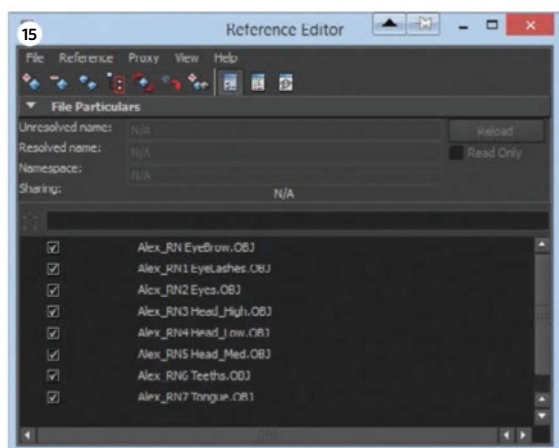




Rendering and look-development

Optimise your workflow

15 Maya referencing Although some artists consider the Maya reference system as being overly buggy, I'm a huge fan of referencing files in my projects. It keeps my scene size small and less prone to crashes. Besides smaller files, the biggest advantage is being able to quickly push updates to Maya. It's a kind of DIY GoZ link. The best part is that it enables you to create a kind of macro for each reference object. Normally I would import an .OBJ and then apply a specific shader on the whole mesh or on certain faces but repeating these steps for multiple objects is quite time consuming and a pretty tedious task. Using referencing is just a matter of reloading the Maya scene.



16 Work on the lighting All good portraits require realistic lighting. My goal was to not make it look like a photoshoot with a typical studio softbox. Instead of using AreaLights, my main light source was a HDR image of a room with bright windows mapped on the colour input of aiSkyDomeLight. This not only gives Image-Based Lighting natural reflections and highlights in the eyes, it also simulates colour bleeding of the environment. This really helped to integrate my character into the background. Finally, add a 3D Plane to gain even more indirect light bounce. This will soften the hard shadows created by the key lights.



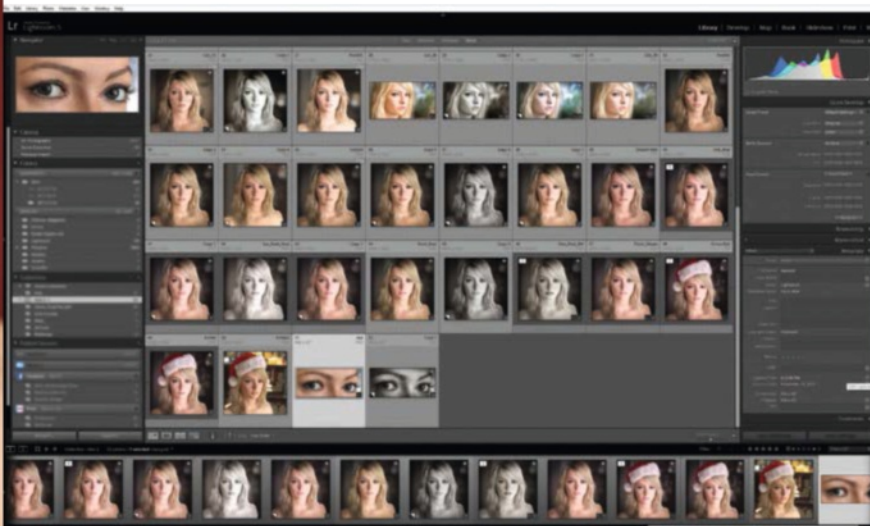
Keeping things real

When working on a single project for many hours it's easy to stop noticing your own mistakes. In order to train myself to observe my work more objectively, I often use Lightroom or a real mirror to flip the image then scale it down to thumbnail size. This helps me to filter out all the information from the face and helps me focus on composition and whether or not it looks realistic enough.

Since our eyes are more sensitive to contrast than colour intensity, a good technique to find the right balance between diffuse and specular is to convert both your reference image and your rendered portrait into black and white and compare the results. You'll find it's much easier to see what's wrong by this method than when simply looking at a full-colour image.



17 Lightroom as look-dev tool Many professional photographers use Lightroom to edit their RAW files. My goal was to reproduce a beauty render that simulated a RAW file with low contrast and lots of dynamic range, then process it as much as a real camera RAW file. This approach really helped me to match my photographic references. For a look development artist, it's important to keep track of progression and compare previous revisions against current ones. Save an initial copy and quickly apply a preset look or add vignetting. This will greatly enhance the final image.





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Artist info



Jesús Fernández
Calderon

3DArtistonline

Username: jesusfc

Personal portfolio site
www.jesusfc.net

Country Costa Rica

Software used ZBrush, Maya,
Photoshop, mental ray, After
Effects

Expertise Working with light
and shade in mental ray

Create overgrown foliage

Castaway 2013

“ Here we will discuss how to create an overgrown forest with a realistic feel using ZBrush, Maya and mental ray ”

Jesús Fernández is a CG artist with a passion for lighting. He currently works in the videogame industry

The overall objective of this tutorial is to reveal how you can create a nature scene in Maya and then render it using mental ray.

The main concept behind the image is to showcase how time and nature might affect a particular model - in this case a boat. We will aim for a high level of realism, based on a library of models and materials. We will use these assets creatively to generate a realistically overgrown and abandoned jungle environment.

First we'll cover the creation of the library using the Maya Paint Effects tool. We will generate a gallery of grasses, plants and trees, and then work on the realistic-looking textures and shaders for the plants. We will also cover practical ways of positioning the stage to ease the process of populating the scene. Finally we will focus directly on the structure and composition of the scene and we will use the mental ray lighting system with a physical sky to achieve the desired level of realism.

Concept

With this image I wanted to illustrate the complexity of a dense and natural environment. The location of the image is a tropical forest, with the various plant life and foliage growing over the central model.





With the Disc

Tutorial files:

- Scene file
- Various scripts
- Video tutorials
- Tutorial screenshots

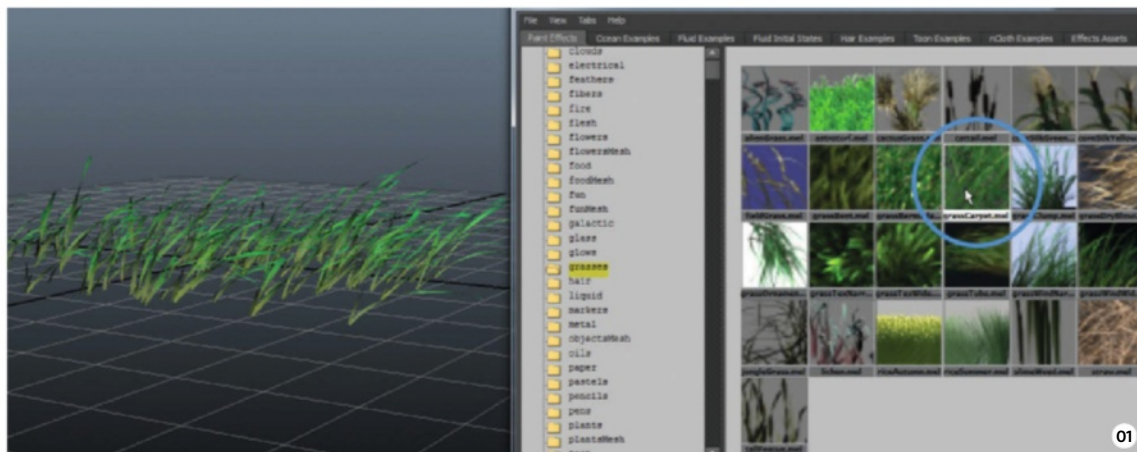
Learn how to

- ✓ Achieve a realistic environment render
- ✓ Learn a fast workflow for a nature scene
- ✓ Produce a flexible library of models and shaders
- ✓ Generate different grasses with Paint Effects
- ✓ Understand the composition of a tropical scene
- ✓ Use of the physical sky in mental ray



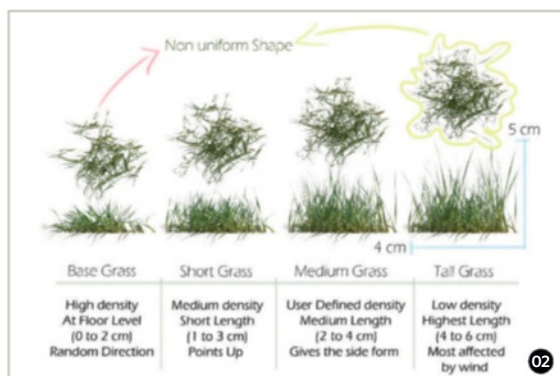
Create assets for the scene

Build elements to populate your scene



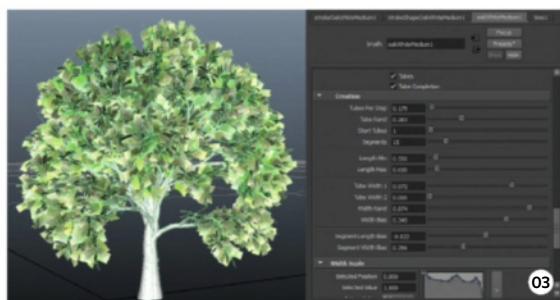
Modelling tips & tricks

For grass the easiest way to get a nice, realistic shape is to make hexagons on the bundles, with some of them more random and with different heights. You can add some small flora at ground level such as ferns, flowers and other little plants. For the trees it might be easier to use programs like Onyx TREE or SpeedTree, while for the ivy you can use Ivy Generator. You can download new textures for the bark and leaves of trees for variety and a more realistic effect.



01 Generate the grass For this process we will be using the grass carpet in Maya's Paint Effects. We have to generate at least three versions of the patch of grass on top of each other, depending on the size of the grass. We must also ensure that the grass doesn't have any force – either wind or gravity – applied to the patch because we want a normal situation for the library. If necessary, we can adjust the models later on, depending on the scene. When you have formed the patches it might be useful to make variations of the bundles for a more realistic result. For more information you can refer to the videos supplied with the issue.

02 Form the bundles We want to create a non-uniform shape for the grass, so we will use a modular system on the grass position and then scale it and add variety to the scene. Make different lines of grass with interesting shapes that won't end up being too repetitive or take up too much memory for the library. Be sure to adjust the tips of the grass so that they are pointed, as the default grass shape is flat. The final patch of grass should be converted into polygons and each bundle shouldn't be heavier than 15k faces, as we're going to use a lot of them to generate the grass on the scene. Refer to the video supplied with the issue for more info.



03 Create the plants and trees It's now time to create the library for the remaining plants and trees. There are two options for this. You can either use Paint Effects for the plants, or you can model specific plants that you wish to use. Paint Effects is relatively straightforward when it comes to trees, though; you can create a simple set of trees with textures already applied. Personally, I also like to also look for reference material for the plants and make specific models of just a few. In this example I created six bespoke plants. Luckily this step is not an exact science, so you should feel free to approach it in any way you wish. If you want access to a larger library of plants, head to www.tinyurl.com/3DATutNobix for a free pack.

Artist Showcase

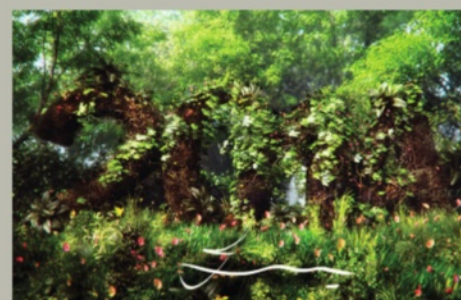
Jesús Fernández Calderon

I'm a CG artist with more than six years of experience working with 3D environments. Currently I am working in the Costa Rican videogame industry. I usually use Maya and mental ray for my work. I'm ultimately hoping to achieve a complete and thorough understanding of the workflow for many varied and different rendering styles.



Forgotten Forest Maya, mental ray, ZBrush, Photoshop, After Effects (2013)

This is a personal project. Everything in the image is 3D, with most of the foliage created in Paint Effects



2014 Maya, mental ray, ZBrush, Photoshop, After Effects (2013)

This is a New Year's greeting card that I created for www.jesusfc.net. It took an hour and a half to complete

Start shading

Set the colour, refractive and reflective appearance of the plants

04 Decide on your plant types For this step we are going to use the mia_material_x_passes material as it will work well for the scene and won't take up too much memory. Firstly we need to pick references for how we want our plants to look. They need to be very different from each other, depending on the type of environment and geographical location of your scene. For this tutorial we're focusing on a tropical forest and for this scene specifically it will be a rain forest, with high reflection levels and a really overgrown environment. Once you have all the references for your foliage, you will need to consider how exactly the material will behave in your chosen environment.

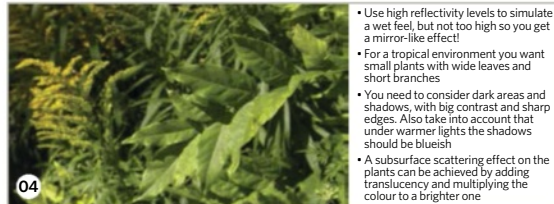
05 Work on the textures Now we know the colours we're working with, we need to create the texture for each different plant. For grass we create a texture for just one blade and generate slightly different coloured versions for each instance of that blade. For tree leaves we can use just one leaf for each species, but for this we would need to create some variations on the tree shapes for a more realistic final look. There is no need to make high-resolution textures as we won't be zooming in close enough to the scene for this to matter. This whole process applies to creating variation in the ivy too.

06 Configure your mia_material These values may change according to the scene and the specific look you're after for your own project. In this particular instance I have set the reflectivity to 1 or just below, and the glossiness between .250 and .480. You can use a lower glossiness to represent an old plant and a higher glossiness for younger plants. Uncheck Skip Reflection On Inside and then change the Index Of Refraction to suit your needs. Each plant has a different index with an average of 1.45, depending on the water density of the plant. Set the Transparency to 0.2, set the Refraction to Thin Walled, tweak the BRDF to Index Refraction Fresnel, or set it manually to 0.100 on 0 degrees and 1 on 90 degrees. Check Translucency and set the weight to 1 and activate Ambient Occlusion with the Ambient Shadow set to black. Of course, these values can be tweaked depending on your scene. For more information on this step, check out the lighting and shading video supplied with the issue.

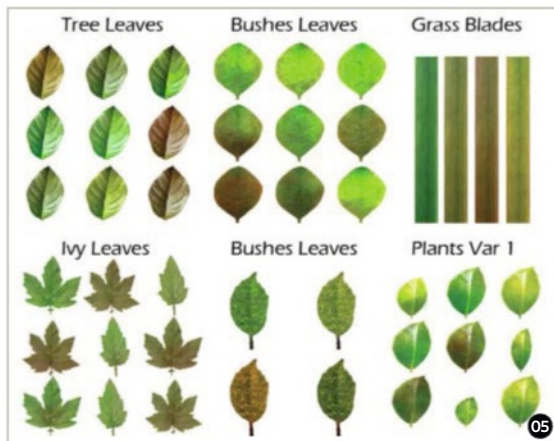


Farmers Vrs Rabbits Maya, mental ray, ZBrush, Photoshop, After Effects (2013)

This is a series of characters created for www.multislot.com. They were created in Maya and rendered in mental ray

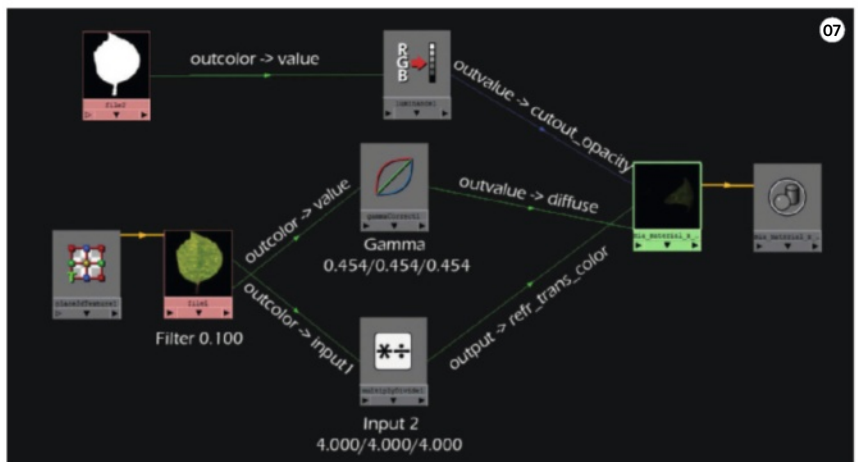


- Use high reflectivity levels to simulate a wet feel, but not too high so you get a mirror-like effect!
- For a tropical environment you want small plants with wide leaves and short branches
- You need to consider dark areas and shadows, with big contrast and sharp edges. Also take into account that under warmer lights the shadows should be blueish
- A subsurface scattering effect on the plants can be achieved by adding translucency and multiplying the colour to a brighter one



Tips on shading

You can experiment a lot when shading. For example, you can use a Reflection map and connect it to the Reflectivity for a more accurate shader. You can also add a Bump map. Usually I prefer to use a Normal map instead of a Bump map. You can create it from the texture image using nDo. You just need to take into account that you have to create the Bump 2D node separately from the network and change it to Tangent Based before you make the connection. If you don't it will not work with the mia_material_x.

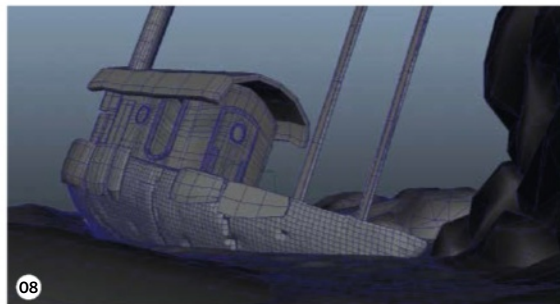


07 Configure connections We must now ensure that everything works together. First we need to change the filter on the file node to 0.1 instead of 1. Next, as we are going to work with corrected colour, for each colour node we're going to add a Gamma Correction node with a value of 0.454 on each of the three boxes. First we need to link the Gamma Correction of the texture to the colour attribute. Next we will create a Multiply Divide node and connect the Gamma Correction to Input 1, and set Input 2 to a value of 4. Now connect the Multiply Divide node to the translucency colour.



Place your elements

It's time to create your overgrown scene



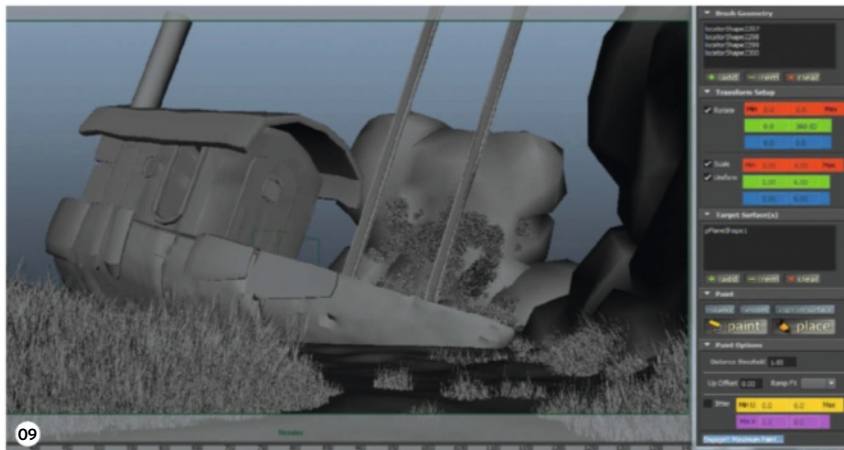
08 Place the core elements of your scene It's now time to start importing into Maya. We've already prepared the library, which is ready to import, so it's time to set the scene with your model. We'll have to work around a 'sketch' of the composition that we wish to use, with our model as the main point of interest. Make sure that you're working with everything set to scale, so one Maya unit is equal to one centimetre. For this stage I used an old boat that I created using Maya and sculpted detail into using ZBrush. I placed the model in the centre of the scene and added some terrain around it, using two different planes with subdivisions to make bulges and deformations. I also chose to add a plane to simulate a pond and add some reflections to the scene.

Placement tips

When placing elements you should think about details such as how the trees might block the light source and how this could affect your scene. Always add in an open spot in the foliage for the incoming light. Also, bushes can come in useful as they can cover large areas of the composition such as the roots of the trees. Keep in mind that the more variety of plants you add the more complex and realistic the final scene will look. Another trick is to create long ivy with a lot of branches and use it as a vine hanging from the trees.

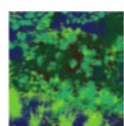
10 Place the plants Now that we have the spPaint3d set, we will start placing the plants. Personally, I like to start with a lower scale for the grass cover, so I place younger grass first, in this case near the border of the pond. Later on, I use a larger scale for the middle grass and finally a tall grass for the last patches, adjusting the growing behaviour depending on how I want light to fall on the scene. If you've included a walkway or path then the grass should be short and patchy in these areas. Repeat this process for the other plants.

11 Position the trees This is one of my favourite parts of the process, as it completely changes the mood of the scene. Surround the boat model with trees, finding the composition you desire. The example on the right works well for my scene, but you may find that a less densely populated effect works best for your own. I prefer to use spPaint3d here because it offers increased control over the scene. For trees closer to the camera, exaggerating the scale can create an interesting effect, as you can see the detail and body of these trees more clearly. It's worth adding ivy and plants to the trees too, or even some moss, for a more detailed appearance.



09 Import the library With the scene and terrain ready, it's now time to import the library models into your composition. The first thing that we need to do is to import the grass, which should then be scaled using a Maya plugin. For this process I used the spPaint3d plugin – you'll find this supplied with the issue. Set the rotation 0 to 360 on Y and set the scale to a minimum and maximum value that you're happy with. Check the Instance for the copies. Next we need to add the models to duplicate. For this we need to parent a Locator to each different model and add the Locator to the brush geometry. The target surface is the geometry of the terrain. Check the video on placing the grass supplied with the issue for more information.





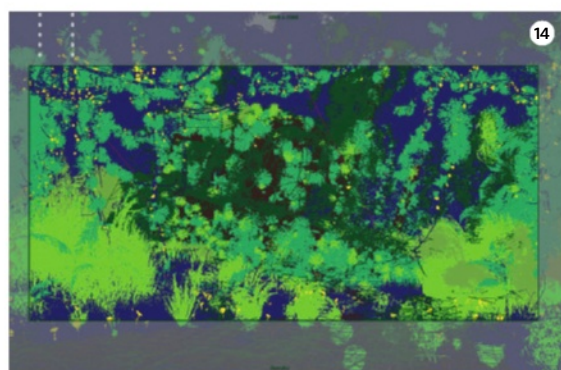
Prepare your render

Set the lighting system with photographic lenses for a realistic look

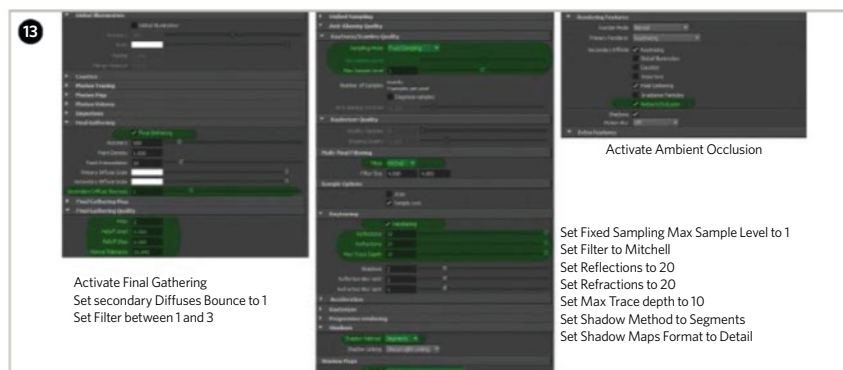
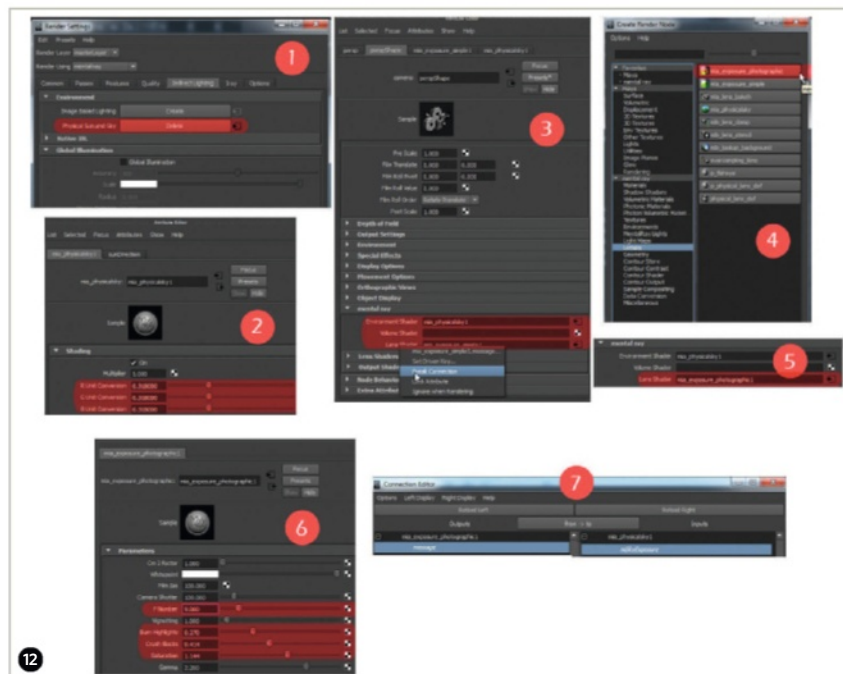
12 Set up the physical sky We are going to use the default physical sky in mental ray. Activate it on the render settings using Environment>Indirect Lighting>Physical Sun and Sky, and on the attributes editor change the RGB unit conversion to 0.318 instead of the default 0.000100. Next select the Camera on the Camera Shape node and on the mental ray tab for the Lens Shader change the mia_exposure_simple to a mia_exposure_photographic. Connect the mia_exposure_photographic to the mySkyExposure of the mia_physically node.

13 Render settings Final Gathering in Indirect Lighting should be set to On. Set the Secondary Diffuse Bounces to 1 and in Final Gathering Quality you can adjust the Filter to a number between one and three. On the Quality tab in Render Settings set the Sampling Mode to Fixed Sampling and the Max Sample Level to 1. Set the Filter to Mitchell, and on Raytracing set the Reflections and Refractions to 20 and the Max Trace Depth to 10. For the shadows set the Shadow Method to Simple, and the Shadow Maps format to Detail. Finally, on Rendering Feature check Ambient Occlusion. Check the lighting and shading video supplied with the issue for more info.

14 Set light direction and composition Experiment with different light directions by rotating the directional light of the physical sky. Once you've found a lighting direction that works, you might find you want to adjust the position of your models. They are instances, but we can still change the scale, rotation and position of the locators, and if there are any overpopulated areas then we can just delete them. Likewise, if there are some overly empty spots we can always add extra models from the library. It's worth experimenting with composition even this late on to get the right look.



15 Final steps Now it's time to work on the final details. Try adding some moss over your various elements. I usually experiment with different camera angles and look for the best composition. We could also set the models as proxies, as this technique will make the scene lighter and easier to render, and it's possible to use a higher number of polygons. There are two ways to achieve this. The first method is to import the library as proxies instead of geometry, and to then place the proxies. The second method is to create the proxies from the already built scene by exporting your models in groups so you can place them later.



Post-production is key

It's important to bear in mind that your first render is not going to be perfect – at this stage it's going to be about 80% of its eventual final quality. The final 20% must be achieved in post-production. I recommend a Depth of Field pass and perhaps some fog on the render as a final touch. It's also very important to carefully adjust the colours in your scene.



Guardian 2013

I wanted to create a believable fantasy/sci-fi character and render it out in a photoreal way. I also spent some time on the background, working on the details so that it really tells a story. My goal was to create a character that could fit in with the Marvel/DC superhero universe.



“I always render out a version of my character at an early stage. I then use the render as a base to paint over and start adding more details in Photoshop in the areas that are lacking. I do this a couple more times before I render out the final image”

I made this...
Incredible 3D artists take us behind their artwork

Artist info



Sven Juhlin

Website www.daybreakcg.com

Country Sweden

Software used Maya, ZBrush, 3D-Coat, Marvelous Designer 3

Bio Sven is a character artist, and works for Guerrilla Games on titles such as *Killzone: Shadow Fall*

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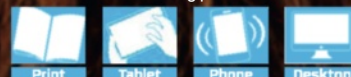
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With the Disc

Tutorial files:

- Action shot .MAX scene file
- Various maps
- Tutorial screenshots

Learn how to

- ☒ Optimise geometry for clean renders
- ☒ Create realistic, layered V-Ray materials
- ☒ Set up V-Ray lights
- ☒ V-Ray physical camera & render setup
- ☒ Compositing render elements in Photoshop

Step by step

Easy-to-follow guides take you from concept to the final render

Artist info



David Vincent Finlay Jr.

3DArtistonline

Username: 3dfinlay

Personal portfolio site
<http://3dfinlay.com>

Country USA

Software used 3ds Max,
Photoshop, Forest Pack Pro,
RailClone Lite, KeyShot

Expertise Creating vehicles and
environments for games and
architectural visualisations

Create a stunning action shot

Times Square Chase 2013

“ This tutorial covers the creation of an over-the-top action shot in Times Square, New York ”

David Vincent Finlay Jr. has been working with CG since 2003

Here we will learn how to create an action shot using 3ds Max, V-Ray and Photoshop. We will also be using KeyShot as a quick alternative to creating an action shot without needing to produce a full CG scene from scratch. We will start the tutorial with the modelling portion

of the shot. Following this we will go over texturing the buildings using Google Street View. Next we will discuss setting up our scene for the lighting and render passes using V-Ray. Finally, we will use Photoshop to layer our render elements and add the final touches to the image.



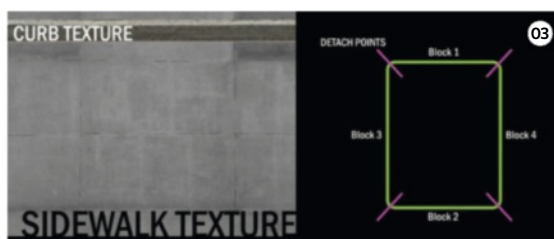
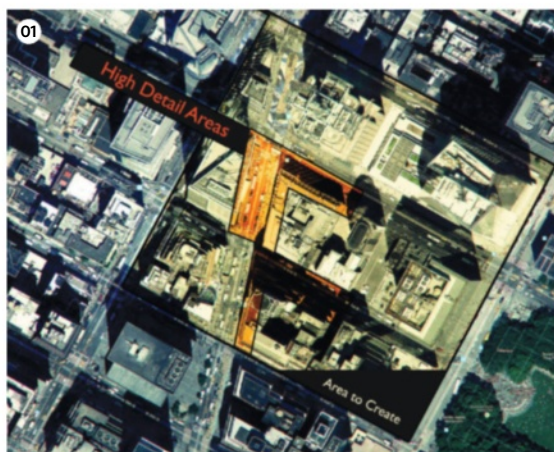
Set up the scene

Start by creating the surroundings for your action image

01 Create an aerial reference image First, we need to use the Satellite View in Google Maps to take plenty of screen shots of the area. I zoomed in so that I could capture the highest resolution images of Times Square as possible and then took multiple screen grabs. I then stitched together the screen shots in Photoshop. You will see in the accompanying image the stitched aerials with highlights showing our main areas of focus. Next, we will start laying out the curbs and roads ready for us to start building on.



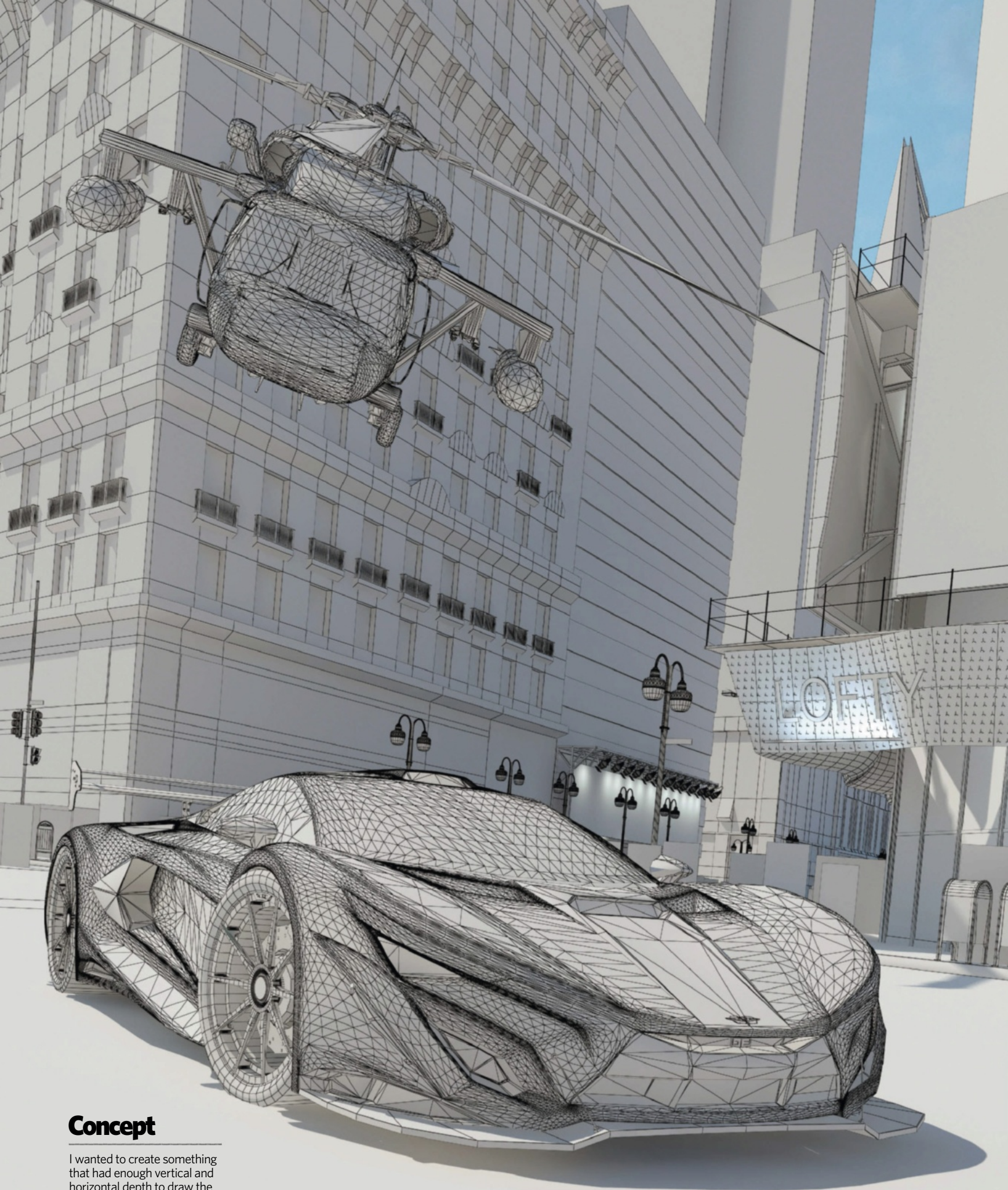
02 Model curbs and roads Using Splines in 3ds Max, trace each of the blocks in the aerial image reference until you have all four blocks traced. Now you need to create your Profile Curve for the curb. This style is a very simple curb with a rounded edge. Select the curb Splines that were previously created and use the Sweep command in the 3ds Max Modifier list. Go to the Sweep parameters and tick Use Custom Section, then click Pick. Choose your curb Profile Spline (Blue), and 3ds Max will sweep your style of curb along the Spline that you selected. To generate the roads, we will need to go into Edge mode and click Bridge between the lowermost curb edges.



03 Texture the curbs and roads I always start by mapping everything with a clean base texture and add grunge later. When it comes to mapping the curbs, we need to select the curb geometry (break the geometry up based off each block for easier mapping) and apply an Unwrap UVW to one of the detached curbs. Expand the Unwrap Tree and select Polygon. This gives you the option of Spline Mapping. Click the Spline Mapping button found in the Wrap section of the Unwrap parameters. Now you should pick your curb Spline and change the mapping type to Planar. Click Commit and then Open UV Editor to finalise the mapping.

Using grunge maps

You can dirty up your scene by adding an additional UV set that uses a different UV channel. This enables you to add endless amounts of layers in your materials and helps break up repetition on your surfaces. Additional UV sets can also be used to add layers to the car paint. For example, if you had a standard car paint with a glossy coat and you wanted a racing graphic on it, you could use a Composite material. The Composite material offers the ability to plug in multiple materials and choose how they overlay. In the next section we will go over the creation of V-Ray materials that utilise this technique.



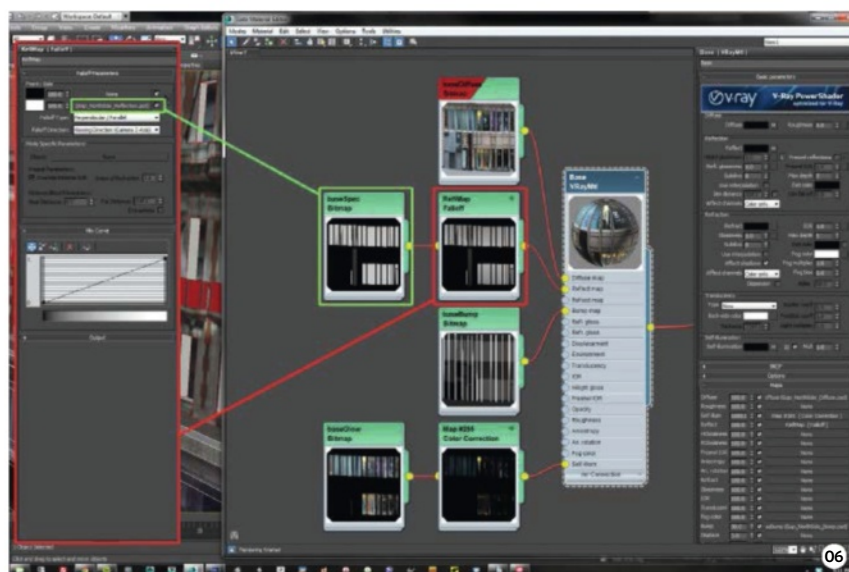
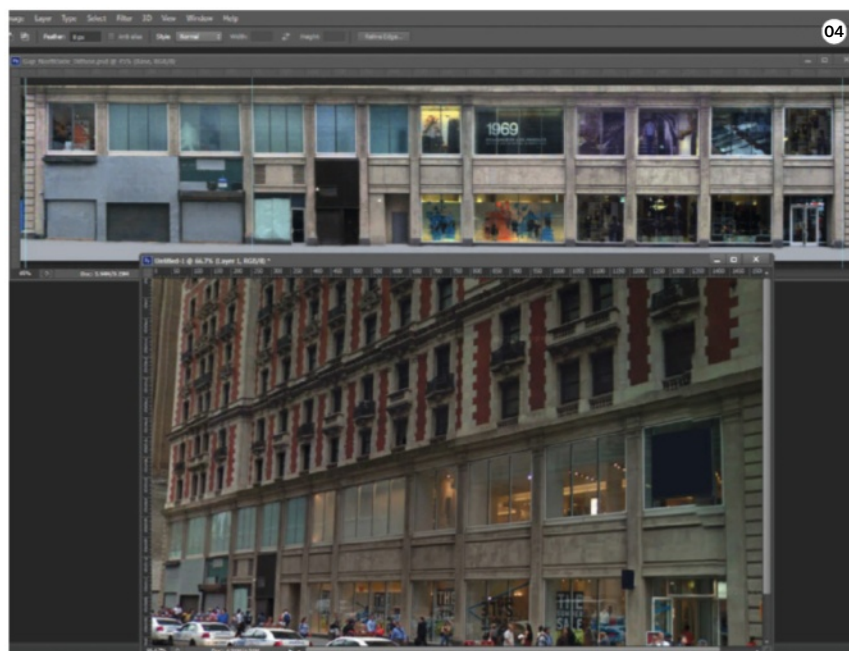
Concept

I wanted to create something that had enough vertical and horizontal depth to draw the viewer into the shot, so I went with a chase scene right in the middle of Times Square

Populate the scene

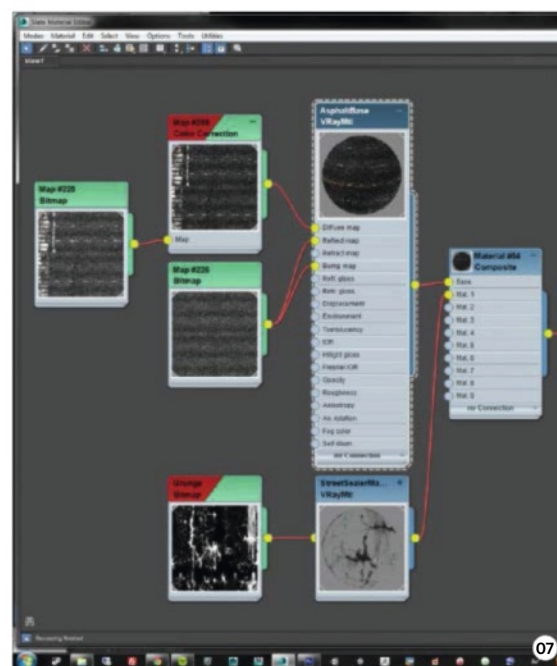
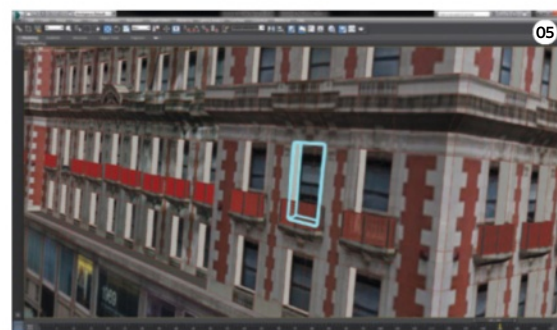
Prepare, model and texture the environment

04 Set up textures using Google Maps Open your internet browser and go to your location in Google Maps. Drag the little yellow person icon into the street to enable Street View. You want to look at the faces of the buildings with the least amount of distortion as possible. You can do this by rotating the Google Street View camera until the perpendicular edges of the building are parallel to the edges of your screen. Take a screenshot and open Photoshop. Go to File>New. The image dimensions should be the resolution of your monitor so press OK. Paste your clipboard contents onto the canvas and this will give you one wall of the building in Photoshop. Do this at every visible angle and use Edit>Transform>Perspective to correct the perspective of your screen grabs.

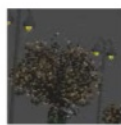


06 V-Ray material set up Start by using the V-Ray material created in the last step. We need to create Specular maps for the buildings so we get reflections on our windows. Take the Specular map created in Photoshop and plug it into the Specular slot of the material. The material settings can be seen with the tutorial images supplied with the disc. You can take the material to this point, but if you have a night shot, also creating an Illumination map will work wonders. You can plug your new Illumination map into the Self-Illumination slot in the material.

05 Model the buildings The first step here is to create a plane that is the same aspect ratio as the image we just created from the Google Street View screen grabs. Create a V-Ray material, plug your texture into the Diffuse slot and apply the material to your plane. This gives us a decent reference of where to split your plane up and add window extrusions and other details. For most of the railings, I use RailClone. iToosoft makes great products that can save time on little details such as this. Repeat this for the other buildings throughout the scene.



07 Use the composite material To get a nice layering of textures and materials, you can use a standard 3ds Max Composite material. Drag the material into the Slate Editor window, then drag in two new V-Ray standard materials. Our first V-Ray mat is a clean asphalt. You can see the settings in the tutorial screenshots supplied with the issue. The second material we create is the street sealant, usually tar. It tends to be a really shiny surface – almost wet-looking – especially in high traffic areas. We can achieve nice results using a standard Grunge map that has patterns similar to those you see in the real world. View the image supplied with the issue for the settings of the Grunge material.



Place your props

Prepare and place the car and helicopter

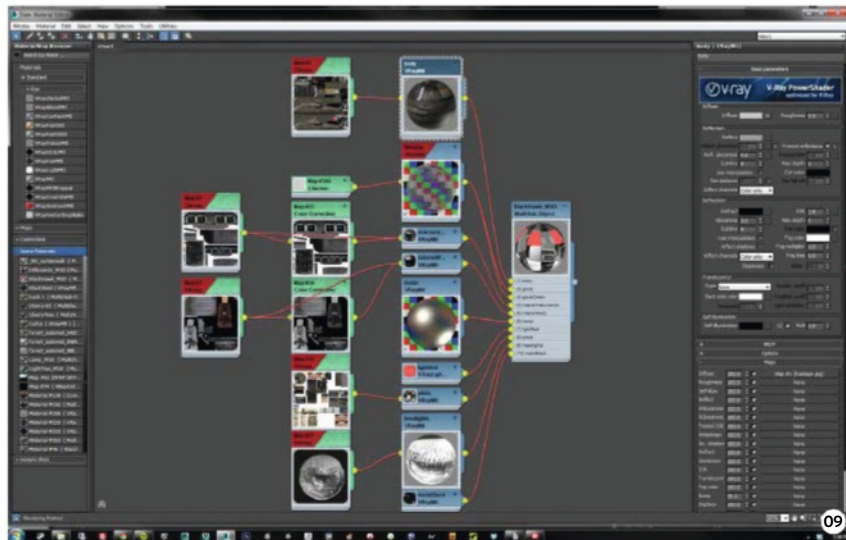


08 Prepare the Specter GT3 The Specter GT3 used in this tutorial was downloaded from Google Warehouse. The model is a great design from Shimmy, available at <http://tinyurl.com/3DASpecterGT3>. First, select all of the carbon fibre and box map it to match the size of the carbon texture we're using. The only materials for this car are car paint, glass, rubber, emissive light and carbon fibre. The setup is basic as we're only working with an exterior shot of the car. You can see the materials used in the screenshot.

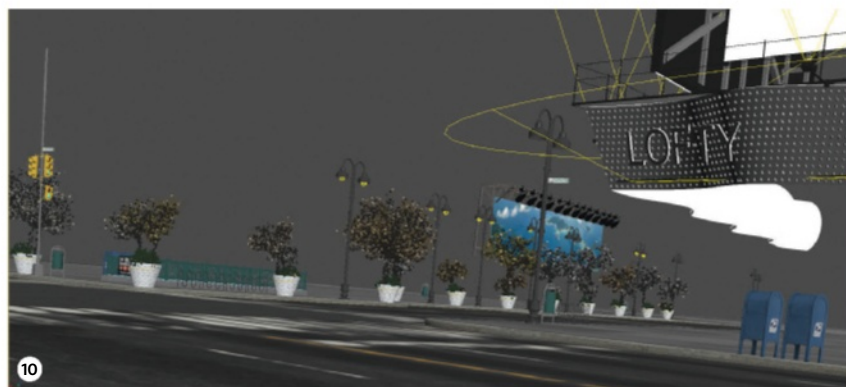
3D Warehouse is a friend

If you're under a tight deadline, you can check out the Trimble/Google 3D Warehouse. All of the models are free and can be used for personal or commercial projects. These models can be a great starting point but usually require a bit of adjustment depending on what render engine you are using. It can be a major time saver when you are in a rush and need to quickly block out a shot.

10 Placing props, people and vegetation Times Square is a densely populated area with regards to traffic, objects and people. However, since most of the shot is taken up by the car, we can be sneaky with our object placement. The only props we need are a bin, streetlights, traffic lights, postboxes and a tree planter. Once we have these prepared, place them and do render tests to make sure their materials are okay. Forest Pro enables you to select a Spline or geometry and apply people or vegetation using their library or a custom object. This is the method I use on a daily basis.



09 Prepare the helicopter I used a helicopter from my library of downloaded free models. You can find many online at the Google Warehouse. You will need to set up new V-Ray materials for the helicopter and to adjust some colours to make it pop a little more in the shot. It's beige and so is the building behind it, so adding some red to the blades and bombs will help differentiate it from the background. Since it is so far away from the camera I didn't spend much time cleaning geometry on it. You can see the materials I used in the screenshot supplied with the issue.



Artist Showcase

David Vincent Finlay Jr.

I am a senior CG artist with over ten years of experience in the games, architecture and television industries. Five years of that experience was spent as a vehicle and environment artist at Rockstar Games, where I worked on *Red Dead Redemption* and the *Midnight Club Racing* series. I currently work at HNTB in Kansas City where we do arch vis work.



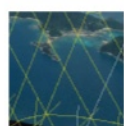
The Loft 3ds Max, Forest Pro, V-Ray and Photoshop (2013)

I found a photo of the stairs you see in the image, and this inspired me to create a minimalist room to go along with them.



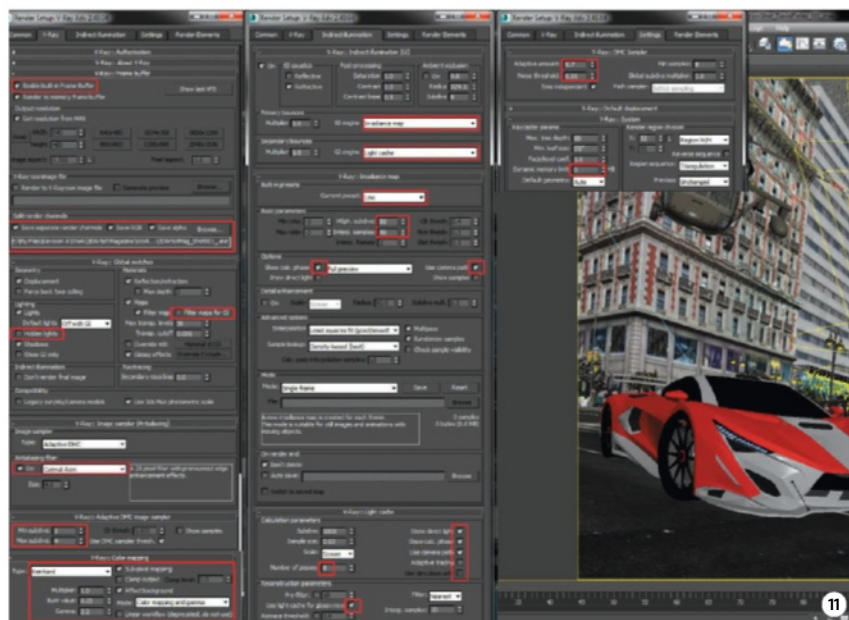
BMW X6M 3ds Max, V-Ray and Photoshop (2013)

This is a BMW model that I created. The backplate used in this composition is thanks to Harniman at www.harniman.com who released his photography and HDRs to the public.



Lighting and render settings

Set up your V-Ray lights and render settings



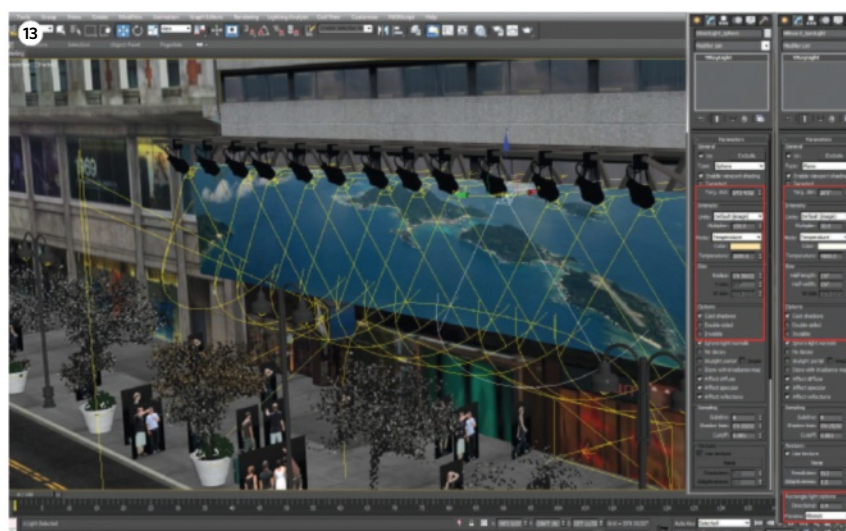
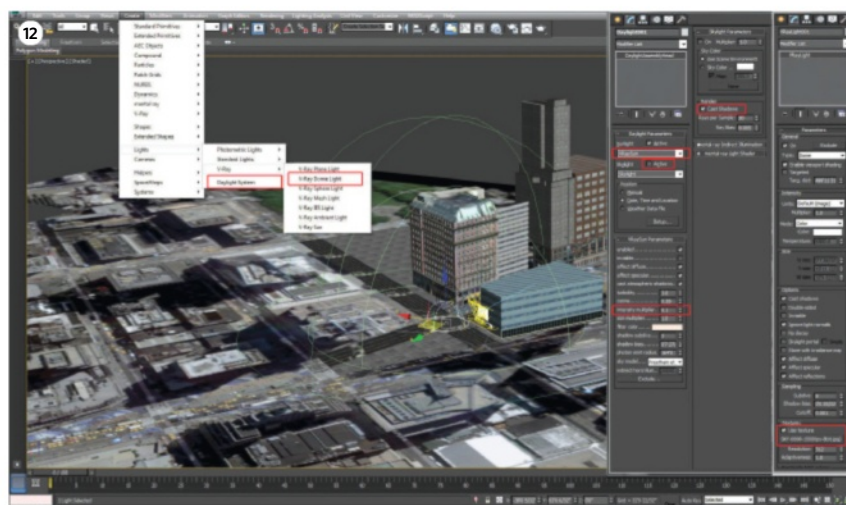
11 V-Ray render settings Before we set up lights for the props we've placed, we need to set up our render parameters with speed and accuracy in mind. You can always go for brute force, but your shadows will be grainier compared to using Irradiance map and Light Cache setups. We are using the latter for our scene and will continue to finalise the settings as we get closer to the end of production on this shot.

Daylight System vs. VraySun alone

There are many different ways to set up your lighting. If you want a quick and easy method you can use a high range HDR image, specifically Peter Guthrie's HDR's at www.3DOcean.net. These give you great lighting with nice, natural shadows. Alternatively, you can use a JPG or equivalent with spherical mapping. Once you've done this, add a Daylight System, set it to use VraySun and to look at the environment already set up. I like using the Daylight System over the standard VraySun because it enables you to choose a location, date and time.

12 Set up a V-Ray dome and sun Navigate to Lights>V-Ray>V-Ray Dome Light. This creates our environment lighting. Tick the Use Texture box and plug your Spherical Sky map into the slot. We need the Sun to provide some nice hot spots on our geometry. To create a Daylight System go to Lights>Daylight System. Make sure to change the Sunlight Type to VraySun and disable Skylight. View the rest of the settings for our Dome and Daylight System in the tutorial screenshot supplied with the issue.

13 Add lights to light poles Ensure that your Dome and Sunlight are rendering well and look acceptable before you start adding other lights to the scene. For the streetlights you will need to use V-Ray Sphere Lights and for the billboard spotlights it's a good idea to use V-Ray Rectangle Lights. Once created, select the Rectangle Light and go to the Rectangle Light Options section. Once there, change the drop-down to Always and set the Directional Parameter to 0.4.



Renault Megane Trophy 3ds Max, V-Ray and Photoshop (2013)

Composition of a Megane Trophy I modelled, textured and rigged. I then set up the lighting in 3ds Max with a Harniman HDR, then composited it with a Harniman backplate.

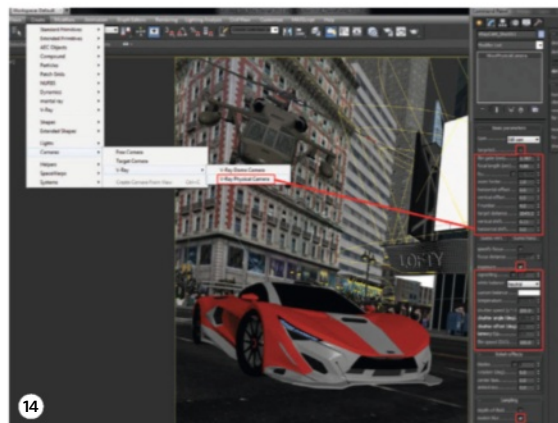


Camera and final post work

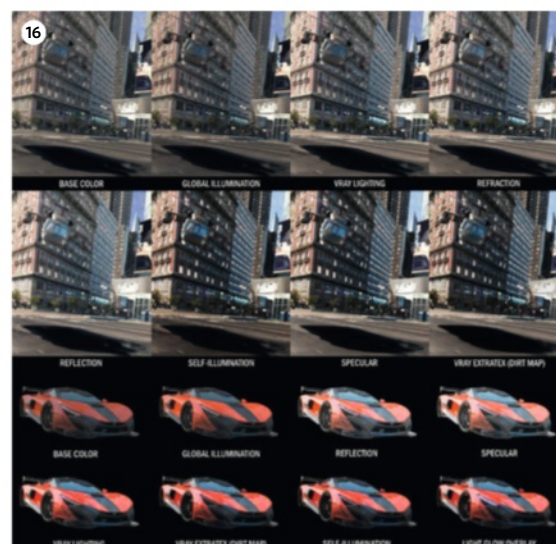
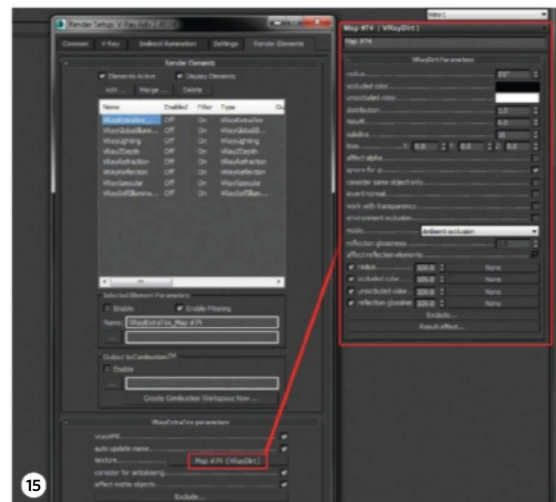
Set up a V-Ray Physical Camera and make final tweaks in Photoshop

The Power of ZDepth

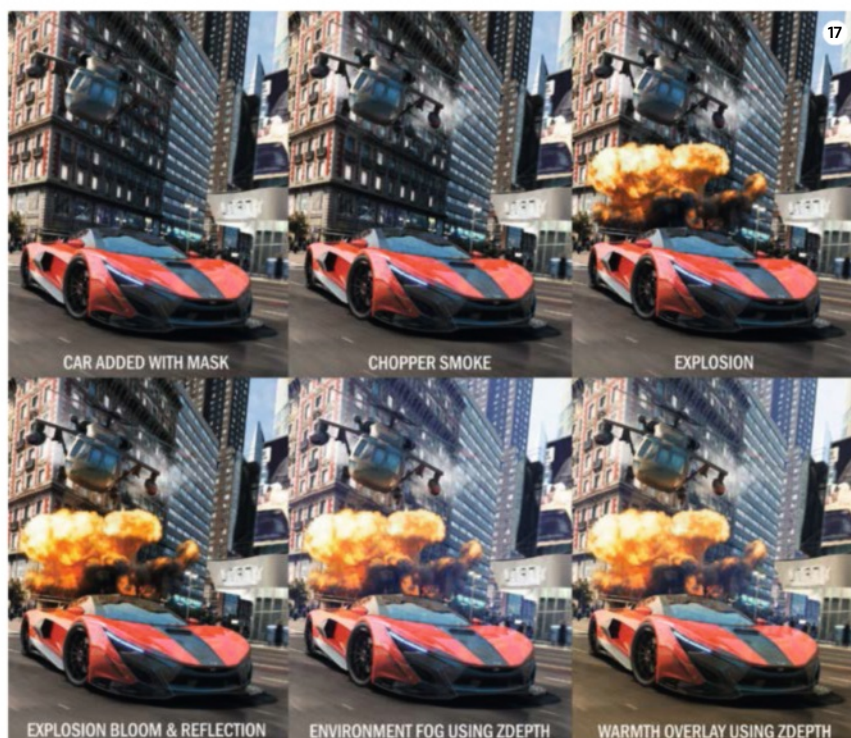
Using ZDepth as more than just a depth of field tool is a great way to add an extra layer of sheen to an image. You can add environment fog like we did in this scene, or you can invert the depth mask and add colour to the foreground. You can even use it to add more glow to objects the further away they get – using this with depth of field and bokeh effects looks very nice indeed. Experiment with different blend modes and colours and see what ideas you can come up with. Sometimes you can get really cool results from something completely unexpected!



14 V-Ray camera set up and animation Start by navigating to Cameras>V-Ray>Physical Camera. We need to set up the shot. The plan is to have the car in the foreground and the helicopter chasing it, so place both in the scene and animate them down the street at a high speed. This enables us to render the elements with or without blur later on. You can use blur in After Effects. The way my blocks are laid out I have two different directions of blur occurring. As such, I got the best results with motion blur directly out of 3ds Max.



15 Set up render elements Before we start doing final renders, we need to set up Render Elements. To do this, open up the Render Setup and go to the Render Elements tab. Now click Add and Ctrl+select VrayExtraTex, VrayGlobalIllumination, VrayLighting, VrayZDepth, VrayRefraction, VrayReflection, VraySpecular and VraySelfIllumination. Go to VrayExtraTex and plug a VrayDirt map into the texture slot and set the radius in the Dirt parameters to five feet. You also want to set the minimum and maximum values of the VrayZDepth element. Measure from your camera to the outermost edge of your scene and put that value as the maximum.



16 Layer passes in Photoshop Knowing which blending modes to use is somewhat subjective since you can do whatever you think looks right, but for the most part you always want your VrayExtraTex set to Multiply and set Reflections set to Color Dodge (Add). You can see how I have set up the layers in the images supplied with the issue and you can also break them down using the supplied .PSD file. The foreground isn't popping from the background as much as I want, so we need to add some life to the image between the car and the buildings in the next step.

17 Add finishing touches An explosion seemed appropriate, so add some simple smoke vapour behind the helicopter launchers. Now we need to add the explosion. I was able to find a great free video of an explosion, which enabled me to choose the exact blast shape that I wanted. Once added we need to solidify the explosion into the scene by adding reflections of the blast onto the helicopter and car. The only thing missing now is environment fog to add a little mood. Create a new layer, choose your colour and use your depth render element as a mask.

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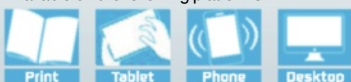


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Masterclass

Benjamin Brosdau, technical director at Berlin's PureRender, explores the depths of shading with 3ds Max and Maxwell Render V3

With the Disc

Tutorial files:

- Complete scene file
- Complete post-work file with all layers
- Collection of all required maps to render the scene

The final result rendered in Maxwell and after post-production in Photoshop

Vegetation with Maxwell Render V3

“Benjamin Brosdau reveals how to shade and render trees with Maxwell Render V3”



The subject of this tutorial is to distribute and render natural-looking vegetation in 3ds Max with the help of the Multiscatter

and Maxwell Render V3 plug-ins. We will consider the general scene organisation, particularly dealing with polygon-heavy assets and tens of thousands of objects. We'll also look into generating vegetation, such as fields of grass, with the expected natural variance in both shape and distribution. Nature is almost infinitely more complex than anything else when it comes to rendering, so we'll look closely at how to handle this level of intricate detail.

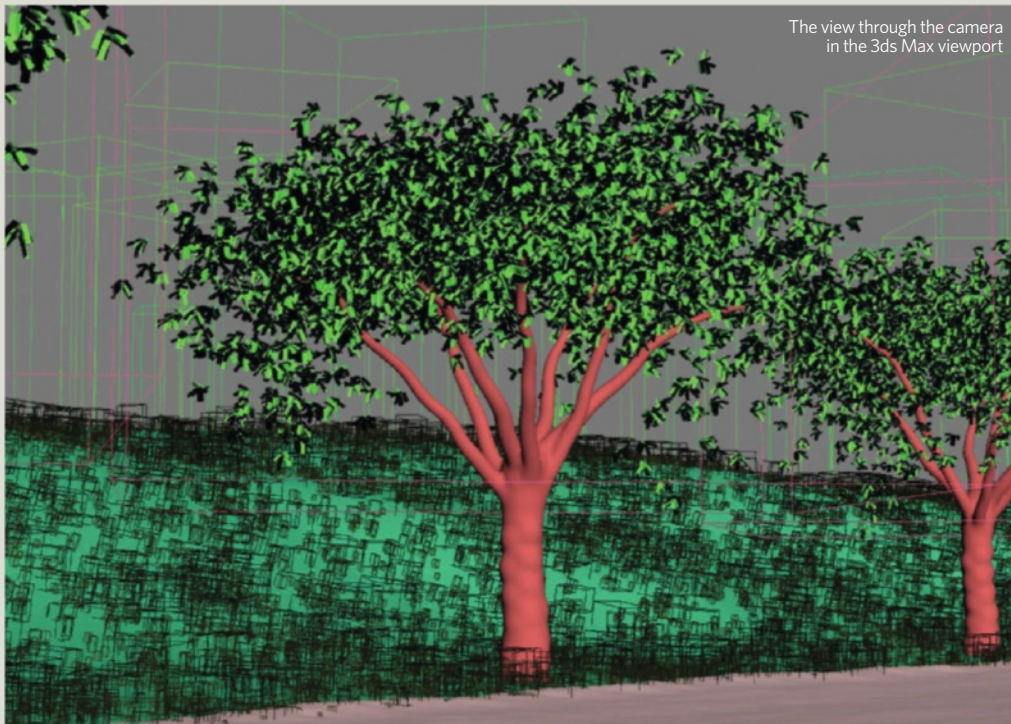
We will consider the individual parts of the Maxwell materials that make up the

sections of the plants, such as a translucent leaf shader, bark shader and blossoms. After this we'll compare different ways to balance render time versus RAM consumption. One crucial decision early in the process is whether to settle for clipmapped leaf geometry, which saves on the polygon count, or to opt for high-polygon leaves requiring larger amounts of RAM but resulting in a faster render time.

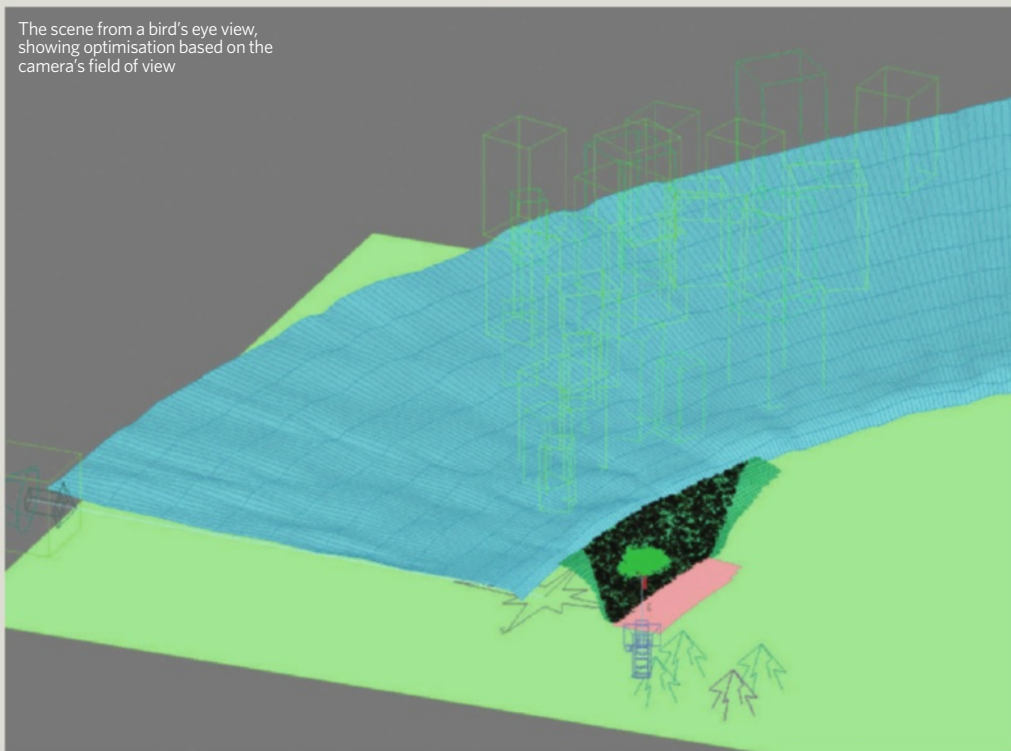
As a general reminder, it's very important to always work with photographic references to judge the appearance of the real world. Generally you can get away with less detail in the background compared to the foreground. A tool like Multiscatter has many facilities

such as level of detail systems and behaviour control based on border or object distance, which is useful for bigger scenes. The larger the scene, the more tricks we'll need to be able to render the entire space. Working with simple clipmapped billboard trees can work well too, if the lighting and perspective matches that of your 3D scene.

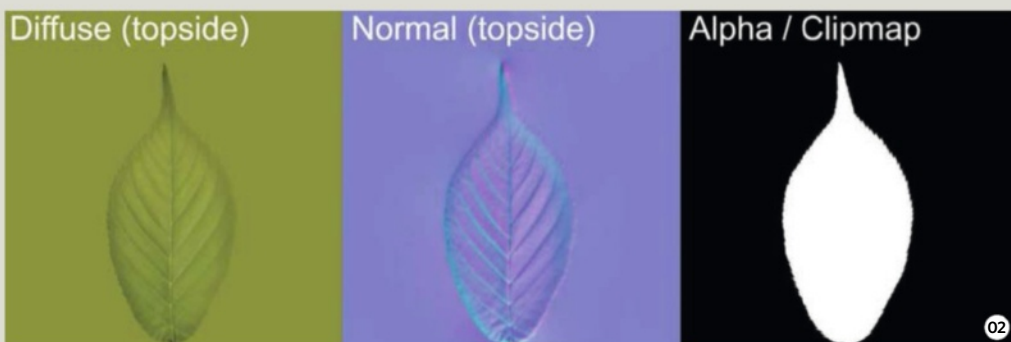
Maxwell Render V3 has new features that can aid us in creating more believable, natural-looking assets such as Back-face Material and, to a lesser extent, volumetric lighting. Still, no render is ever complete without some retouching. As such, we will complete the look in Photoshop by adding atmospheric effects.



The view through the camera in the 3ds Max viewport



The scene from a bird's eye view, showing optimisation based on the camera's field of view



Diffuse (topside)

Normal (topside)

Alpha / Clipmap

02

Prepare your materials for use in the scene

01 Gather reference

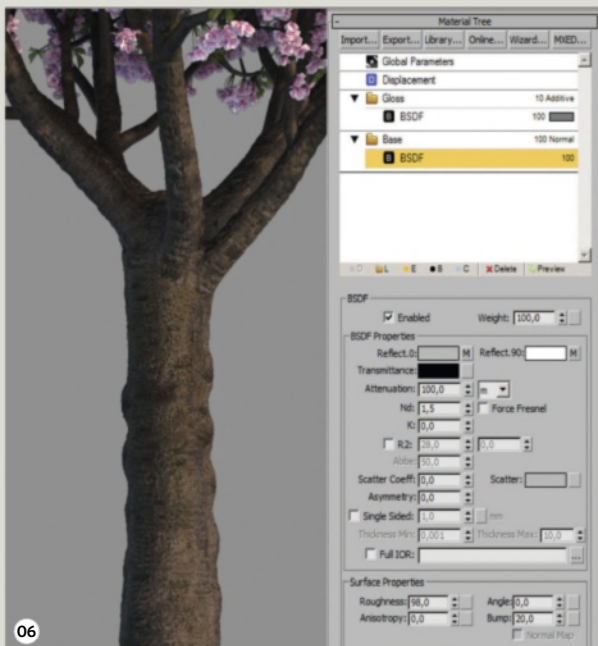
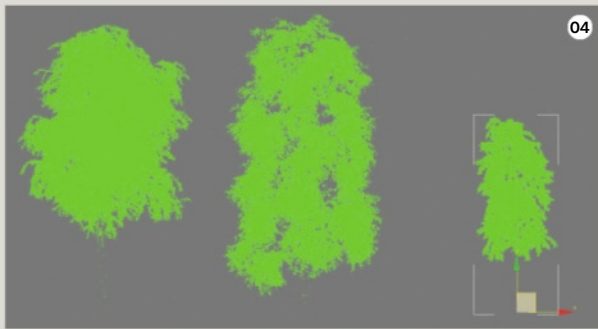
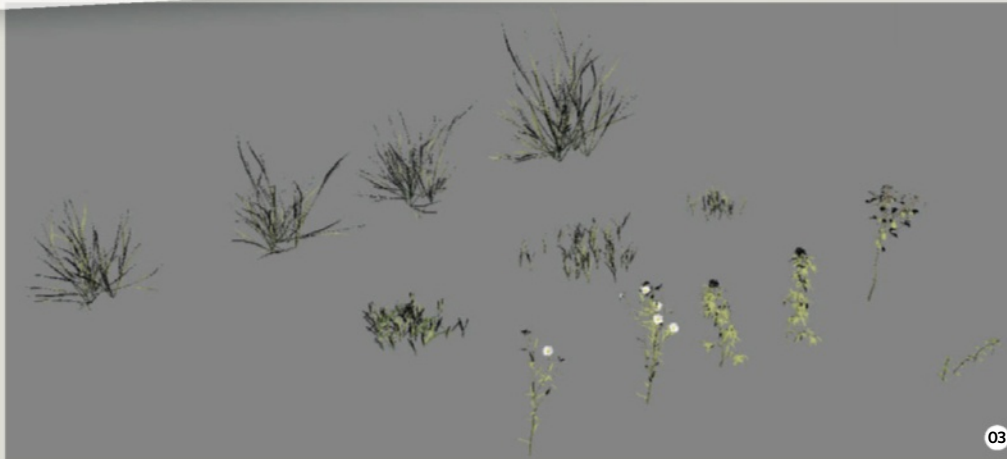
Gathering appropriate reference is, of course, an important aspect of any kind of CG undertaking, but it is especially crucial when dealing with natural objects and vegetation. Over the years I have gathered a large collection of plants, trees and anything nature-related to draw inspiration and create textures from. References can be anything, from mood images to orthogonal photographs of leaves or bark. They can come in very handy. You will find a selection of textures and maps supplied with the issue.

02 Create textures using Photoshop and CrazyBump

To be able to use the textures in our project we need to derive a set of suitable images from them. Diffuse textures should show as few highlights as possible as highlights tend to look quite misplaced during rendering. Usually Photoshop is all we need for the textures but using a specialised tool such as CrazyBump can lead to better results. Faking geometrical complexity using normal maps for the leaves can work well and sometimes you can get away with it for the bark as well. If you have trees with a rougher bark such as aged oak trees you might have to revert to displacement mapping, especially when the tree is seen up close and in detail.



01



03 Examine the various elements

Nature provides limitless variations effortlessly, but unfortunately this isn't so easy to achieve in CG. We can only have a certain number of model variations in our scene, but it's the placement of these models that will make the scene seem more realistic. Here a total of 16 different objects will be scattered to create the lawn that takes up a large part of the image. We need to divide them into groups such as tall grass, low grass, flowers and ground coverage. We will add further randomisation by scaling and rotating them slightly differently for each instance during render time.

04 Organise the scene within 3ds Max

Large scenes can rapidly become tedious to work with. Besides using 3ds Max scene layers, it's a good idea to make use of Maxwell's referenced MXS feature. This greatly reduces resources during navigation and makes saving the scene much faster. Maxwell will have a visual representation of the actual object in the viewport that can be scattered normally, but the actual geometry is only loaded up during render

time. It's also a good idea to use this for heavy pieces such as complex trees that don't need to be too precisely placed.

05 Shade the leaves

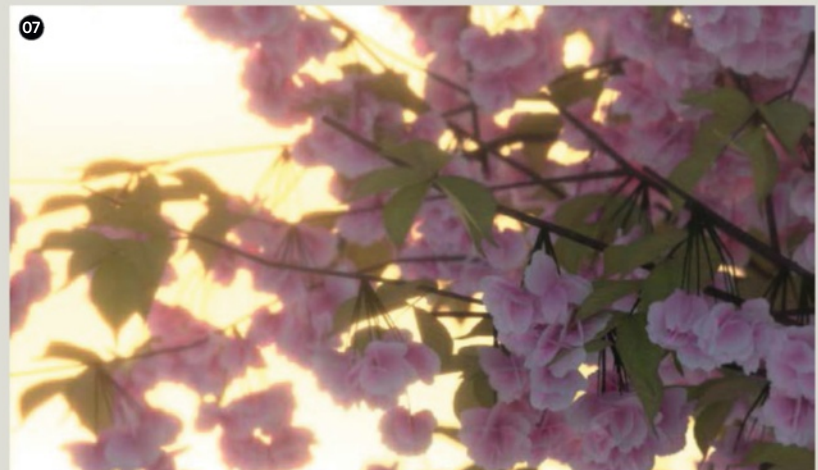
Arguably the most important aspect of the trees is the appearance of the leaves. Building up on the textures we generated earlier we can judge that we will need to address three different components to succeed – namely colour, reflectance and transmittance. To make the leaves more believable we can use a new feature in Maxwell called Back-face Material. This enables us to use two different textures for the top and bottom part of the leaves, allowing each part to shine through depending on the light and viewing angle.

06 Shade the bark

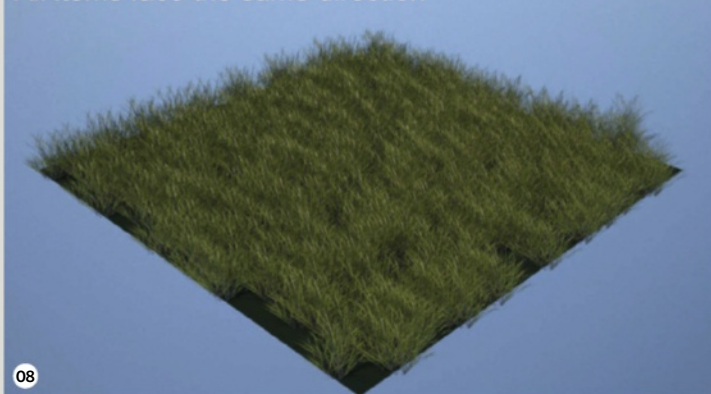
The bark on younger cherry trees tends to be quite smooth and glossy looking – if it hasn't been treated with protective paint. We'll go for the natural look and use a two-layer approach, one layer for the diffuse part and another for the glossy part. To break up the uniformity of the highlights, the roughness parameter in the top layer is mapped with a greyscale version of the Diffuse map. Since the tree is quite prominent, we will go with Displacement mapping rather than normal mapping.

07 Shade the blossoms

Shading the blossom isn't too dissimilar from shading the leaves since it requires a translucent component to look believable. For the sake of simplicity we can leave out a reflective layer. Instead, take a two BSDF approach, using a Lambert Base layer mixed with a Translucent layer on top. Map the Transmittance with the blossom texture we generated earlier. If the tree was further away we could settle for geometry without clipmapping as the render speed would be higher and the coarser look would probably be unnoticeable.



All items face the same direction



Randomized size and rotation adds chaos.



08 Distribution instances using Multiscatter

There are many tools dedicated to the population of scenes with many instances. Maxwell even has its own dedicated scattering tools. Here we'll take a look at Multiscatter as it offers an even greater deal of flexibility. We always need a surface or spline to scatter our objects onto and then we can add as many different objects as we like to be distributed based on a series of different parameters. The most common actions are to add variation to both scaling and rotation so not all objects are aligned in the same way.

09 Optimise the scene

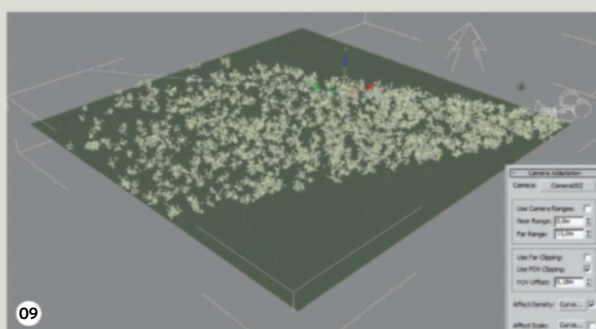
Usually we can get away with fewer instances, which helps to cut down on the required resources on the computer and means we can achieve faster render times. A good idea is to thin out the scattered instances over distance and – even better – cull objects outside the camera's field of view. It's a good idea to leave a few metres of leeway on both sides. This will even work in animations.

10 Set up the light

Setting up the lights for this scene was pretty straightforward. I used the Physical Sky and Sun and controlled the position of the Sun manually with 3ds Max's Daylight System. For the sake of speed, disable all the scattered items to find a nice position for the Sun – often a slightly backlit scene works well for vegetation as it creates a translucent effect on the leaves. We can also increase the diameter, causing the shadows to become softer.

11 Alter the settings in Maxwell Render

When dealing with Maxwell's render settings it's certainly fair to say that there's beauty in simplicity. High sampling levels are usually not required for a clean result when dealing with exterior scenes, provided



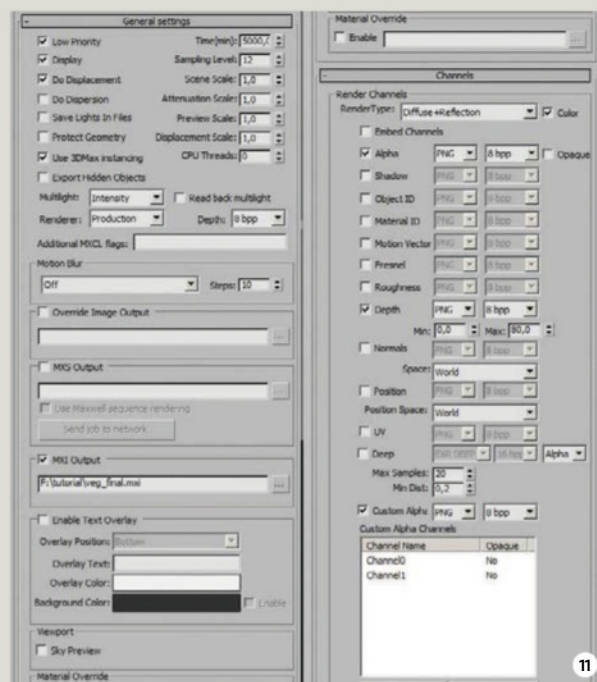
Order inside chaos

While we have many tools available and an infinite number of scene possibilities, we should consider that nature has a plan for everything. Nothing is truly chaotic – it's only following obscure and hidden rules. Longer, greener grass tends to grow without constraints in places where there is plenty of water. Grass will wither, wilt and pull back under huge trees where the dense canopy means that only a little light can reach the ground. Everything grows towards the sun and areas of constant shade will be less densely populated and look much less inviting.

the materials are set up properly. We will go for a desired Sampling level of 12 and enable the use of the Depth and Custom Alpha channels to aid us during post-production. We can also enable Multilight.

12 Post-production in Photoshop

Save all your data from Maxwell using 16-bit .PNG files. Always make sure to save the .MXI file directly in Maxwell as well, making it easier to work on serious edits and to create changes to lighting and exposure. Doing this directly in Maxwell will always give better results due to the higher bit-depth. In Photoshop we can add a little atmospheric fog for the background trees as well as applying simple corrections to colour with the aid of a rendered mask.



3DArtist Back to basics

Mark Lee shows how to re-create the stop-motion style of one of this year's E4 Awards finalists

Master the stop-motion techniques used to create this E4 E Sting

With the Disc

Tutorial files:

- Tutorial screenshots



Ten steps to stop-motion style animation

“Master ten fundamental techniques to turn your animation into a stop-motion masterpiece, using squash and stretch, frame rates, noise and more”



'E4 World' is my entry into this year's E4 E Stings competition.

It's a quirky stop-motion Plasticine world that encapsulates the E4 brand and – luckily for me – it made it into the final 24 of the competition and is currently being shown on television.

As a brand, E4 is generally a bit weird and offbeat in tone (in a good way, of course) and it has introduced stop-motion in some of its previous E Stings. For this reason, I thought I'd stay on-brand and create an E Sting that stayed true to the strange little E4 world.

Here I'll reveal a selection of techniques I used to create the stop-motion feel in the short. I tried to replicate a classic Plasticine effect, so incorporated traditional principles such as squash and stretch, anticipation and reaction, as well as a lower frame rate to achieve the jerky look.

I'll run through a few hints and tips on ways to achieve a convincing stop-motion look in CG without having to go down the gruelling route of creating a new 3D model for every frame of your animation, like the stop-motion masters of years gone by. I'll also touch on lighting the scene, working

with CG Plasticine and some quick tricks for animation to help bring in a playful feel.

These ten techniques should get you on the way to creating your own Plasticine stop-motion animation, but the same principles can also apply to any style of stop-motion – for example, Lego would look great with these techniques too.

It is possible to achieve the same results in any of the main 3D packages, but my arsenal of choice was 3ds Max for all the modelling, texturing, lighting and rendering, Fusion for compositing and Premiere for editing and audio.



Use an animated Noise Modifier to add natural variation between frames

Stop-motion in CG

01 Working with Plasticine

When you think of stop-motion, you think of Plasticine. It's as simple as that and that's largely down to Nick Park and Aardman Animations. For me stop-motion is all about the Wallace and Gromit era. So, that's the approach I went for in this project. To produce a convincing piece of CG stop-motion, you have to start with the models themselves. My Plasticine objects were all loosely modelled, kept chunky and where edges were needed I used as large a chamfer as I could. Don't get hung up on the small details, but embrace the imperfections. The material I used was a VraySSS shader with a fingerprint Bump map applied, and then combined with a Noise Modifier on the geometry to produce a convincing Plasticine effect.

02 Toy with frame rates

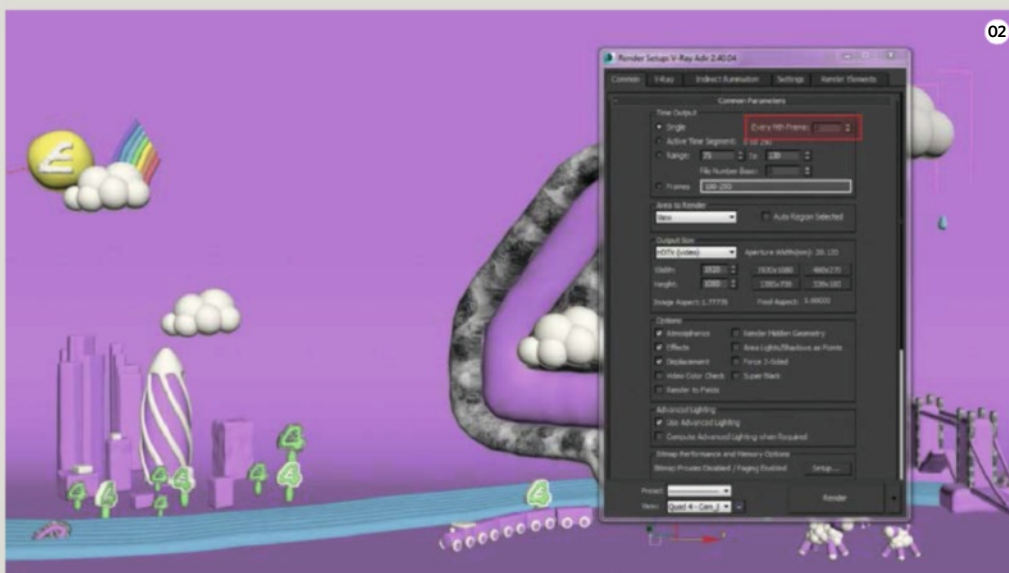
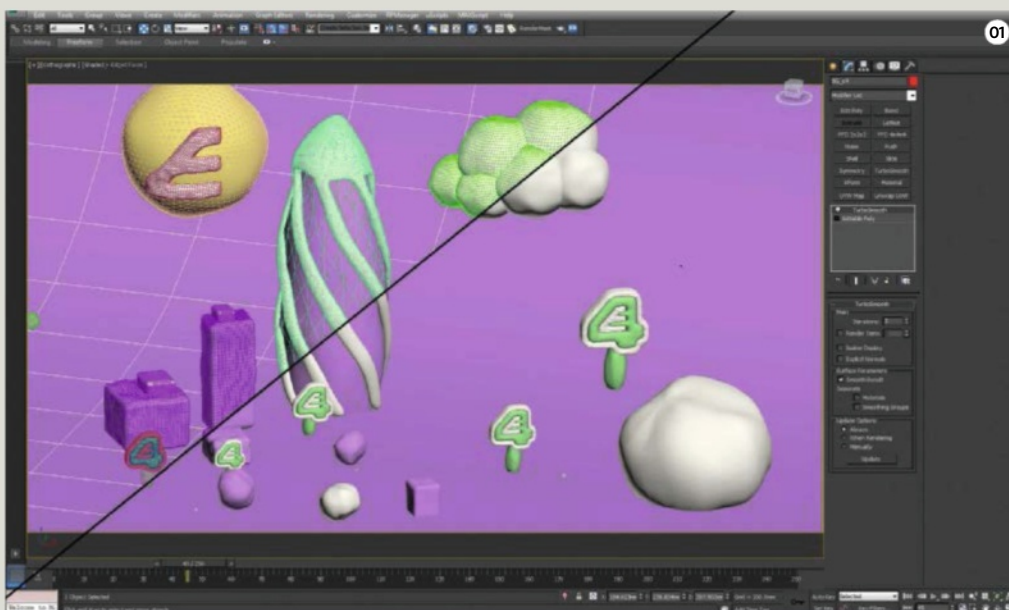
When rendering out your animation, the easiest trick to achieving the stop-motion feel is to simply render out every other frame. In 3ds Max, set your 'nth' frame dialogue box to 2 and it will skip rendering alternate frames. For my E4 E Sting I tested every second, third and fourth, each having their own merits, but every second looked the right amount of jerkiness for what I wanted. This will roughly make your animation 12 frames per second. Have a play and see what every third looks like on your individual animations. It can be worth experimenting depending on what style you're trying to achieve.

Hold the frames

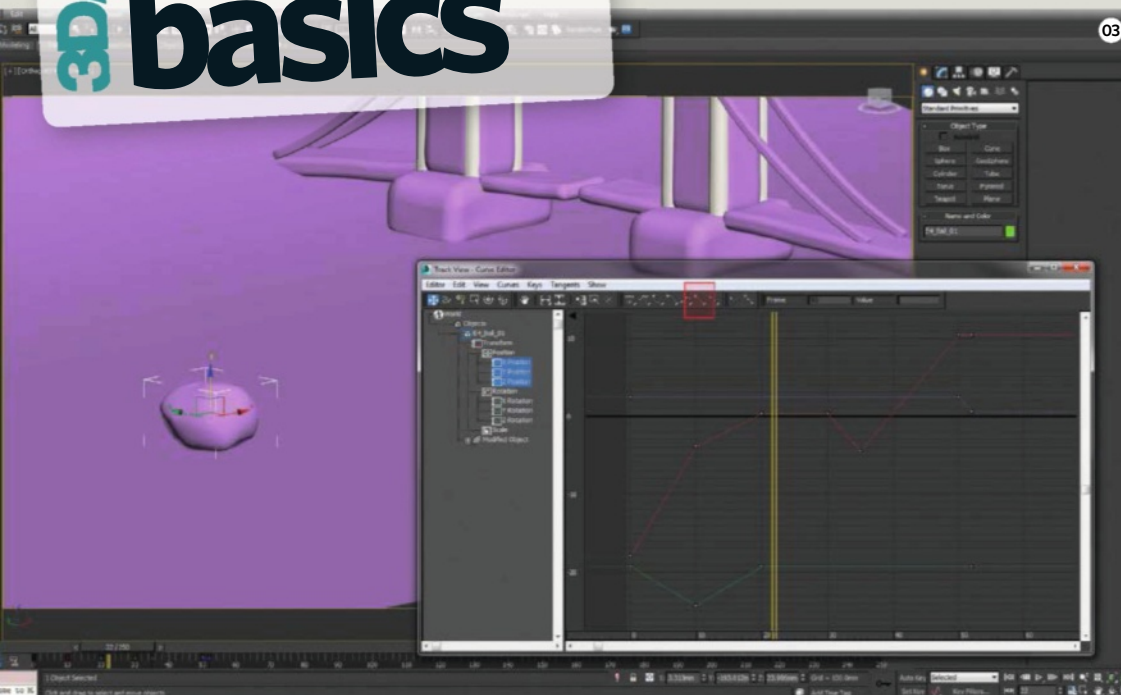
Once you've animated your scene, you've rendered it out, and you're ready to work on in post-production, don't forget to ensure your final frame rate is set back to 25fps. In 3ds Max, you rendered every other frame using the 'nth' frame option, so now in Fusion (which I use) set it to Hold Previous on missing frames, essentially filling in the gaps by displaying the previous frame twice, and creating the slightly jerky look. If you forget to do this, you'll have a very quick and short animation!



Introduce squash and stretch into your animation



Back to basics



03

03 Embrace imperfection

Resist the urge to smooth out your animation curves as you would normally do. If you stick to clunky linear tracks it will add to the feel we're looking for. The beauty of traditional stop-motion is in the imperfections, so don't try and make everything perfectly smooth. Instead embrace the lumps and bumps. The odd jolt here and there is fine and, for once, I found the more I overworked something, the worse it looked. Block out your movements and resist trying to iron out every crease in your curve editor.

04 Animate noise

To add natural variation between each frame of the animation, use a Noise Modifier and animate the Phase over the duration of the animation. This will ensure that your models are different in each frame, as they would in reality, especially in the Plasticine world of my E4 E Sting. You could even animate the strength of the effect randomly over time so that in some of the frames the lumps are more prominent than in others.

05 Key in visibility

It's not how you would traditionally animate, but it adds to the stop-motion feel if objects pop in as if from nowhere. When animating objects appearing from nowhere such as growing trees, rain from clouds and so on, simply animate the Visibility value over two frames, from 0 to 1, and your objects will pop out from thin air. There are many ways to do this but in 3ds Max this is an easy method for quick results.

06 Add squash and stretch

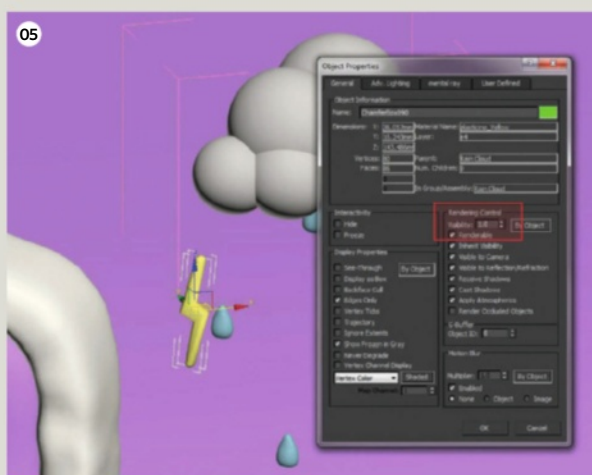
To give your animation a playful feel that is typically characteristic of many stop-motion films, go back to basics and introduce the age-old concept of squash and stretch. If you were animating a ball of Plasticine falling to the ground, stretch it out as it falls and squash it down as it hits the floor. If you exaggerate this effect, it will add a playful feel to the motion. I did this on my random drops of Plasticine and it really helped them feel more natural.



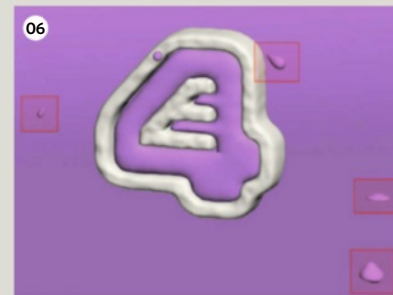
04

Try out other stop-motion styles

These ten principles can be applied to other styles of stop-motion animation too, not just Plasticine. Lego, for example, is a classic stop-motion format. Re-creating Lego in 3D is a perfect opportunity for a small amount of squash and stretch to give it a quirky twist, and some anticipation and reaction will give Lego figures a wonderfully playful feel. The same frame rate principles apply and playing with depth of field on close-up shots of characters will really help to sell the small-scale Lego world.



05



06

07 Use depth of field

When rendering out your animation, make sure you've set up a ZDepth pass so that you can apply a realistic level of depth-of-field in your composite later on. As the Plasticine world is generally quite small scale, you can add a lot of realism by playing with the level of blur you apply in post. I generally render to EXR files and include a VrayZDepth element in the file to make things easier. For any close up shots, keep your subject in focus but give the background some blur to achieve the shallow depth of field look. Experiment with introducing objects close to the camera to add depth to the small scale set.

08 Utilise anticipation and reaction in your characters

To exaggerate the playful feel of your stop-motion animation, try adding a bit of bounce to your objects. Disney pioneered the use of anticipation and reaction in the golden days of 1930s animation, but the principle still applies today. Make your objects and characters anticipate their own movement by squashing down or moving in the opposite direction before launching into their action. Instead of making objects come to a standstill, liven them up by moving them slightly further than your end point, then bouncing them back. This also works for objects growing by making them grow a bit bigger then making them bounce back to their final scale. I used this technique on the objects in my E4 E Sting when they grew out from the floors.

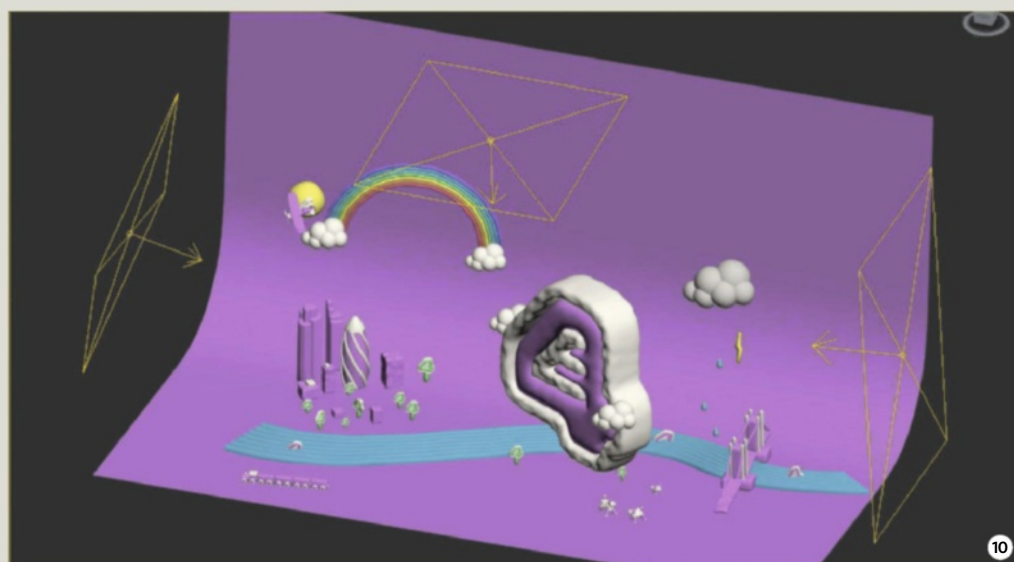
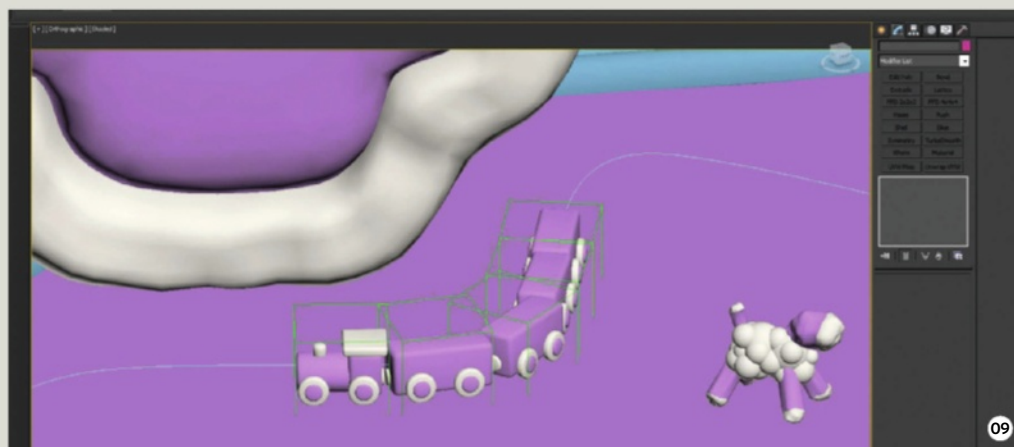
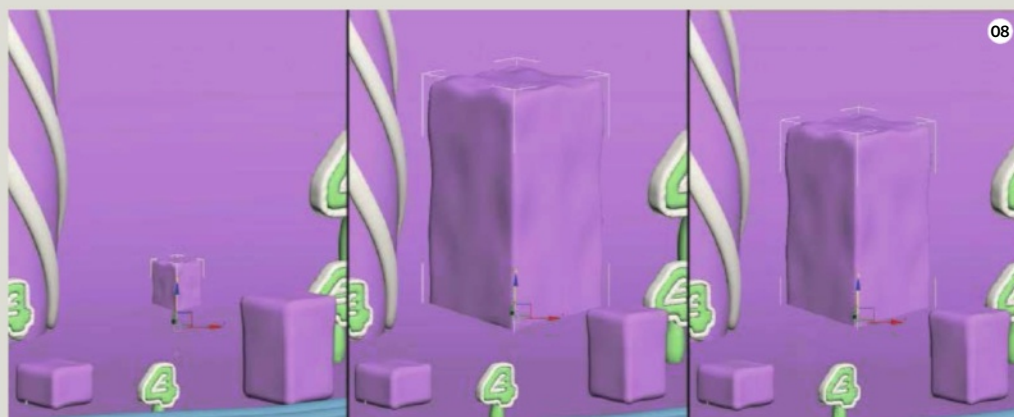
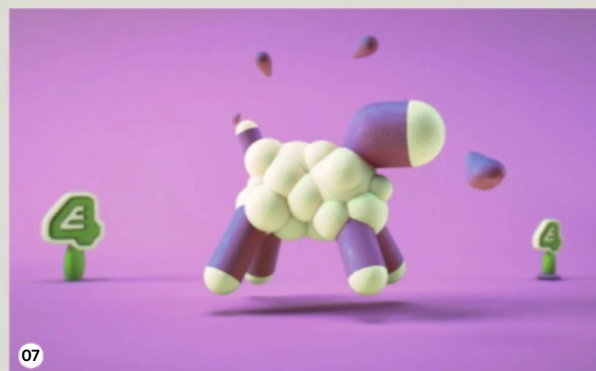
09 Animate along splines

An easy way of animating objects such as the train or plane in my E4 E Sting is to draw a spline for the path you want them to follow and link a dummy to the spline using a path constraint. This gives your objects the ability to bank with the spline, and control the timings of how long it takes to move along the entire length of the spline. Once you're happy with the path, simply align your object to the dummy and link it for your object to move along the path. Another advantage of this is that when you adjust the spline, the path the object takes also adjusts and you don't have to tweak any animation keys.

10 Light using a small set

There are a few things to consider when lighting stop-motion, the main one being that in reality natural daylight is rarely used due to the potential changes in lighting conditions on each frame. As such artificial lighting is the main source. Your subject matter is generally small – in this case,

small scale Plasticine models. Your lighting setup therefore needs to replicate the real world set that this small scene sits in. I wanted a neutral background so I used a traditional photography cove and lit this with two fill lights, one from each side, slightly forward of the subject, pointing back towards the backdrop. One light was cool while the other was warm to give a gradient across the scene. Then I added a light above the scene, pointing down and towards the backdrop to light it from above.



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The advisors

Arnold, Maya

Lee Griggs
www.solidangle.com



Lee currently works for Solid Angle, where he writes documentation and tutorials for the Arnold renderer. See below for his basic introduction on using Arnold effectively

Cinema 4D R15

Gustavo Åhlén
www.facebook.com/gustavoahlenstudio



Gustavo Åhlén is both founder and creative director at Enginotion. He is also a visual artist, 3D and VFX designer and matte painter for the films, games and advertising industries

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Tutorial files:

- The robot MA file at both the start of the process and the end

An intro to Arnold

“What are the basic techniques underlying the use of Solid Angle’s Arnold renderer?”



Arnold is an advanced Monte Carlo ray tracing renderer built to deal with the demands of feature-length animation and visual effects movies. This is a beginner’s tutorial to introduce MtoA, a plug-in that allows you to use the Arnold renderer directly in Maya.

In this tutorial we’ll cover how to build a simple photographic lighting studio setup that can be used for lighting and rendering. We’ll go through the steps of lighting, shading and rendering a toy robot model, and we’ll use Arnold’s lights to achieve a photorealistic lighting setup. You can also use Maya lights when rendering with Arnold. If you select a light and then inspect the Maya attribute editor, as well as regular light attributes, you’ll see a new group of Arnold attributes for the light, which is where any additional settings can be accessed.

Using the Ai Standard shader, we’ll shade the robot and give it a metallic

finish. The Ai Standard shader is capable of producing all types of materials, from plastic to car paint or skin. The Standard shader can be a bit daunting at first – it’s very powerful and enables a large number of different materials to be created. Due to the large number of controls, the Ai Standard shader is split up into several groups. We’ll need to adjust the Diffuse and Glossy attributes in order to achieve a brushed metal effect.

We’ll also look at some of Arnold’s camera lens options to produce realistic depth of field, and finally consider how to optimise render settings and eliminate any noise that may appear.

Although Maya and MtoA have been used in this tutorial, much of the content relates to Arnold in general and as such is relevant to other Arnold implementations such as Softimage for Arnold (SltA) and Houdini for Arnold (HtoA).

You can download a trial of Arnold at www.solidangle.com/arnold/try

Maya 2014

Michael Levine
www.michael-levine.com



Michael has worked in VFX for over 16 years. Specialising in cloth simulation and character hair, he has worked for a range of big names, including Disney, ILM and Sony

LightWave

Craig A Clark
www.scorpiocgi.co.uk



Craig is a hard surface modeller with just over 14 years of industry experience, varying from films and television work to music videos, games and visualisations



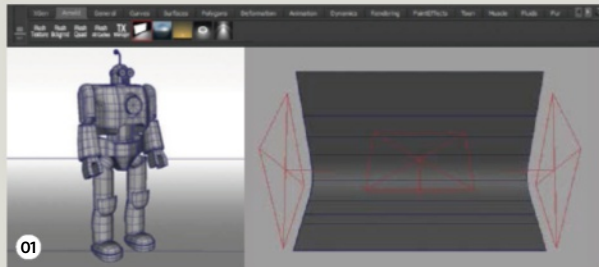
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01 Scene set up

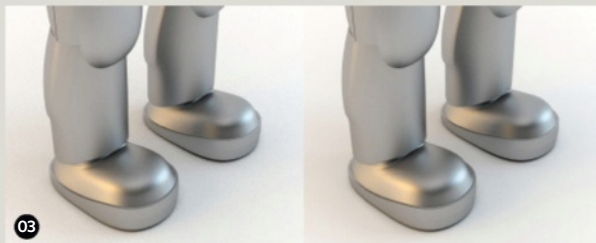
Start by opening the Arnold-robot.ma scene supplied with the issue. In the scene you should see the robot model (positioned at 0,0,0 on the Maya grid) and a simple studio backdrop model. First, we want to light our studio scene. Start off by creating three Ai Area lights. This can be done by clicking on the light icon on the Arnold shelf or by selecting it via Arnold>Lights>Area Light. Position one light on either side of the model and another in the middle above the robot. Rotate them so that they are pointing inwards towards the robot as indicated in the accompanying screenshot.

02 Light settings

The scene may appear dark when it is rendered. We therefore need to increase the exposure of the lights. Under the Arnold attributes, increase the Exposure to around eight for each light. Change the colour of the lights by enabling Color Temperature. Select the right light and enable the Color Temperature within its Arnold attributes. Leave it at its default temperature value of 6,500 as this will give a cool blue feel to the light. Select the light on the left and do the same, except change the Color Temperature to a warmer colour, something like 4,000.

03 Light samples

You may notice some noise in the shadows from the Ai Area lights. This is because the light's samples are set to one by default. To reduce the noise, try increasing the light samples to three. This setting can be found in the Arnold attributes within each light. Light samples control the quality of the noise in the soft shadows and direct specular highlight. The higher the number of samples, the lower the noise, and the longer it will take to render.



Sampling and noise

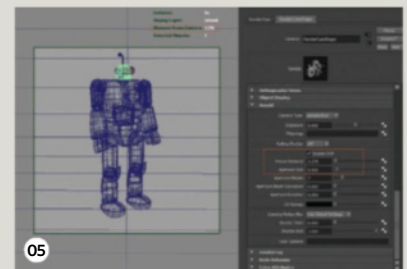
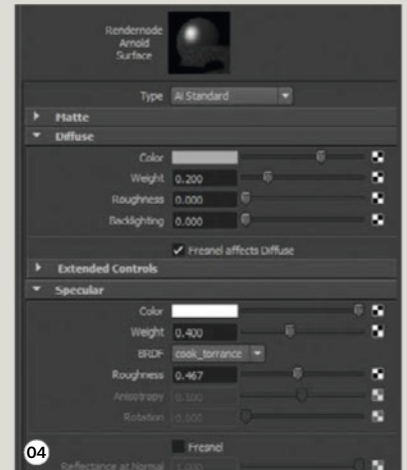
Noise nearly always comes from insufficient sampling, but increasing sampling for the wrong rays can make the render times increase without removing noise. The aim is to allocate rays as effectively as possible to minimise the noise efficiently. If the Camera samples have to be increased to remove DOF noise, the other settings must be lowered to keep render times manageable. If DOF or motion blur isn't a concern, then increasing Camera samples would fix all noise elsewhere but would also slow render times from the unnecessary rays.

04 Shading

Assign an Ai Standard shader to the robot. To turn it into a brushed metal material we will change the following settings. Lower the Diffuse to 0.2 and change the Diffuse Color to a mid-grey colour and increase the Specular Weight to around 0.4. The Specular Roughness controls the glossiness of the specular reflections. The lower the value, the sharper the reflection. Leave it at its default value of 0.467.

05 Camera depth of field

We can use Maya's native camera to render the scene using depth of field. Select the render camera and open the Arnold attributes in the attribute editor. Click on Enable DOF. You won't notice any difference in the render unless you increase the Aperture Size. However, you will need to focus the camera on something first. To do this you should select the robot's head and go to Display>Heads Up Display>Object Details. This will show you the distance between the camera and the head model. Type this value into the Focus Distance attribute. Now when you increase the Aperture Size you should see that the robot's head is in the camera focus. Try a low value, such 0.05 (although it is worth noting that this value is scene scale dependent).



06 Rendering

Rendering the scene using the default Camera (AA) setting of three is good enough for test renderings, but for a final render you'll need to increase this to at least five depending on the amount of depth of field you have. There may be some noticeable glossy specular noise on the robot due to poor sampling of the indirect specular component of the robot's shader. Increasing the global Glossy value to three helps resolve this noise and creates a clearer render. You will find the finished scene also supplied with the disc.

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Realistic glass in CINEMA 4D R15



“How can I improve the quality of glass created in CINEMA 4D?”



In this tutorial we will focus on the creation of glass materials in CINEMA 4D R15, using the native render settings that come with the software rather than a plug-in.

First we need to think about the composition of the scene. We need to add a background stand similar to that used in photography. This can be used as a background and also to direct the shadows of the objects. To create this support we need to add a simple spline following the desired shape, and then use Extrude to create a polygonal backdrop.

Next, it's time to think about the lights that will illuminate the scene. For these you can add some rectangular area lights. Alternatively, you can add two rectangular planes and then check the Illumination box to generate lights from the planes.

Finally, you must add your cameras to gain better control over the scene. This step is very important – although we can often avoid the use of cameras, when moving around the scene during the creation process we can lose the original angle and focus. I always recommend using cameras to ensure you have an accurate position to return to, meaning

you avoid problems in subsequent editing steps. You can activate or deactivate these cameras to edit the scene objects but you won't lose your angle of focus.

I recommend that you search online for information about how to create a simple studio set up using the lights, cameras, and different parameters available in CINEMA 4D. There is plenty of information available that can help you when arranging your composition.

When it comes to materials and rendering glass, you must pay close attention to the parameters that you're using, because these will either increase or decrease the reality of the materials in your final render.

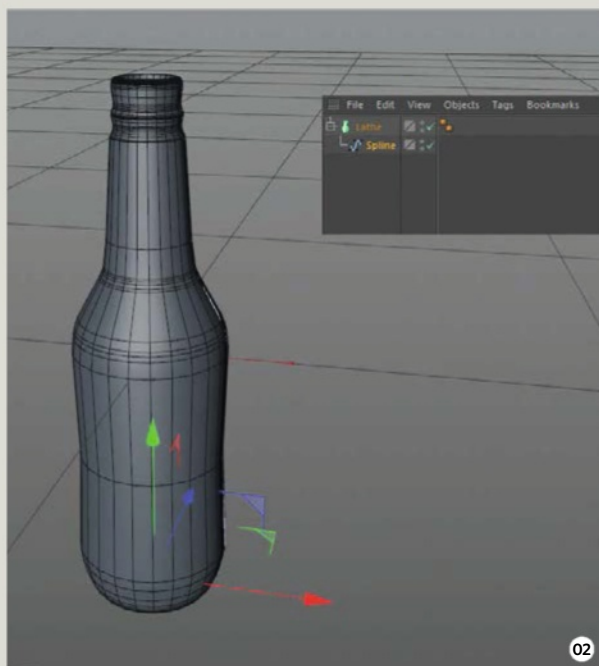
For this type of work it's best to use Global Illumination, as GI uses a rendering algorithm that will present more realism in the final scene. This process not only calculates direct rays of lighting to objects, but also the rays reflected by other surfaces, whether reflective or not, making for a more believable scene.

Be sure to check the tutorial files supplied with the issue for a 30-minute video tutorial that goes into more depth and detail on the whole process.



01 Create the shape of the bottle using splines

First we need to create the model of the bottle. Select frontal view, go to Options>Configure>Back, load your reference image, then go to the Up menu and select Bezier. Using the reference image, you need to create a spline following the image while also using a double line to define the thickness of the bottle. The points at the base of the bottle near the X-axis should be slightly higher than 0 because in the following steps we will approximate those points to 0 to achieve a good weld between them. We don't need to worry about this at this stage.

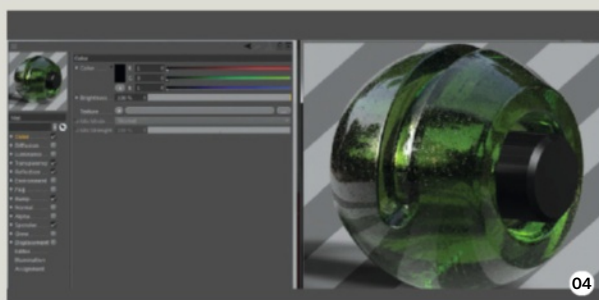
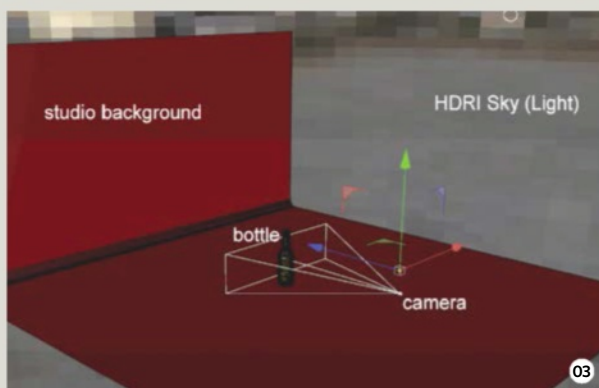


02 Convert all the splines into polygons

The process discussed in this step is very useful when it comes to creating different types of bottles or vessels. By learning and adapting these techniques you can create any form within the middle of the object. Go to the Up menu, then press and hold over the Subdivision Surface icon and select Lathe. Once we have added Lathe to the Object panel we need to drag and drop the spline that we previously created into the Lathe object. Select the spline and check the Close Spline box. Now move the vertex of the splines at the bottom and try to get a good weld between each side of the X-axis.

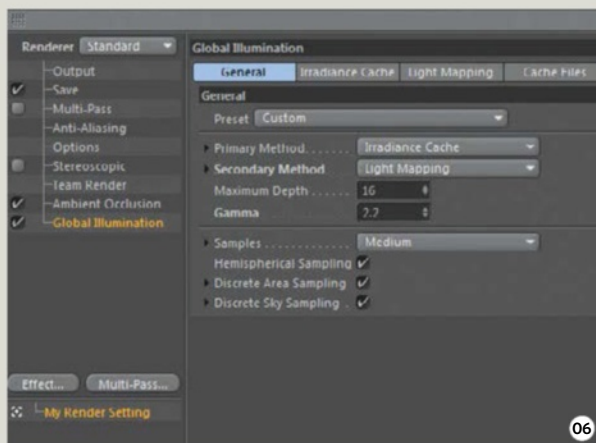
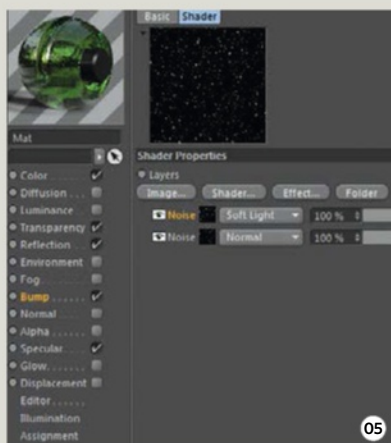
03 Start experimenting with your lighting

The composition of the studio is one of the most important steps when it comes to selling the reality of the scene. In my case I prefer to test the lights before adding the materials so that I don't overload the rendering time and so I can see a preview of the quality of light and shadows. Create a background by making a spline shaped like an L (see accompanying image). Select the middle vertex and Ctrl/right-click and select Chamfer. This will chamfer the angle, achieving a smooth shape. Add Sky as the light and apply a HDRI material from the CINEMA 4D library over the Sky object.



04 Make the glass material

Carefully creating the glass material for the bottle is paramount when attempting to achieve photorealism. Go to Create>New Material and activate the channels Color, Transparency, Reflection, Bump and Specular. Bear in mind the options of refraction in the Transparency channel. In the accompanying video and tutorial screenshot you can see the parameters used for each channel. Create a red material for the studio background with the Color and Specular channels activated.



05 Add irregularities to the glass material

Go to the Bump channel, select Shader and add two channels of Noise. The first one should use a blending mode of Soft Light with the layer beneath it set to Normal. Now select the layer at the bottom using Noise Naki with the parameters set to Octaves=1, Global Scale=20%, Low Clip=50 and High Clip=100. In the other layer (Up), select Noise Poxo and use the same parameters as in the other layer. We can test different types of noise according to the irregularities that you want to achieve, and you can add extra layers if you so wish. This process will create a glass material with a small bump.

06 Render settings

Go to Render>Edit Render Settings, select Effect, add Global Illumination and then Ambient Occlusion. In Global Illumination, select Primary Method>Irradiance Map, then Secondary Method>Light Mapping. I prefer to use Gamma 2.2 because when I used a value of 1 I found that I ended up with black dots all over the studio background. By experimenting with the parameters of Global Illumination, we can quickly test different values of the Primary Method, increasing the values of Intensity until we get a good render that we're happy with. Don't forget to activate Evaluate Transparency in Ambient Occlusion.

Glass transparency and colour



In the Transparency channel, test different values of refraction and brightness. Low values of brightness will create a solid material without transparency and high values will increase the transparency of the glass. In Absorption Color don't use high values of distance because this will absorb other colours from the scene. These values are really important because if you change the HDRI map or you use another type of illumination as lighting, you will need to change the previous parameters according to your desired results. Finally, I added oval droplets using the Cloner Object tool.

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Maya, XGen

Groom hair with XGen

“How can I use the new XGen feature in Maya 2014 to create hair?”



Like Ptex, XGen started as a proprietary tool developed at Walt Disney Animation Studios.

It has been production tested on many high-end CG features, and it's now available to the general public in the Extension for Maya 2014.

XGen gives users a great deal of control, depth and power over instancing arbitrary geometry onto a surface. This geometry can be hairstyles, grass, rocks, scales, feathers – pretty much anything you can think of. XGen deserves an entire book of its own, but let's get started with setting up a basic Hair System that can be used and tweaked later. You can add and subtract new guide hairs with ease without needing to redo your setup, and it works well with Ptex maps that you've painted from Mudbox. Your Hair Description can also have an additional layer of procedural modifiers layered on top of it if you so desire.

Until now, there hasn't been an elegant way to use brush-based tools to groom hair in Maya. Any solution required the purchase of additional third-party plug-ins. Thankfully, XGen's Grooming tools enable

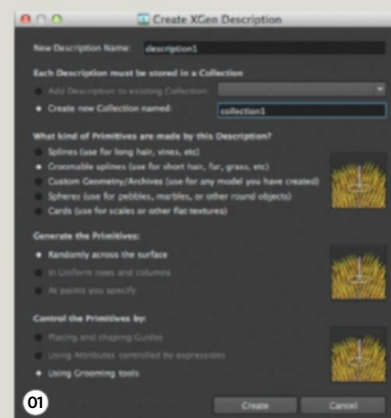
you to style hair without needing to tediously select and drag individual points on a curve.

The list of things you can do and the tools with which to create them can be overwhelming, but the key here is to experiment and to have fun. Clicking the down arrow next to an Expression button will enable you to control most parameters with either an Expression, Painted Map or a Slider, so have fun with these various capabilities and see what you can do.

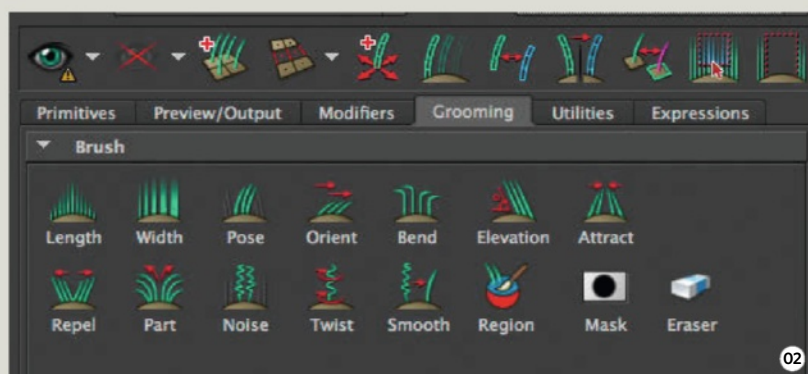
XGen can be used in the standard Maya workflow in conjunction with Paint Effects and Nucleus for dynamics. Using XGen with nHair is an ideal solution for grooming and simulation in Maya without having to purchase extra plug-ins. As this is a first public release, it's probably a good idea to save your work often.

01 Create a description

Before starting, make sure that the `mayatomr.bundle` is loaded in the Maya Plug-in Manager and set your render type to mental ray. Select the model that you want to add hair to and then go to XGen>Create Description, select Groomable Splines.



Groomable Splines work best for shorter hairstyles, while Splines work better for long hair. Descriptions are the hairstyles made of Instanced Primitives, and they are stored inside Collections for your project. The only option under Control Primitives that you can select is the Using Grooming Tools button. After selecting Create, XGen will add all the controls, options, and shaders for your groom. Click the Eye icon and toggle on Update Automatically as this will show your groom changes without needing to keep pressing the Preview icon.



02 Start grooming the look

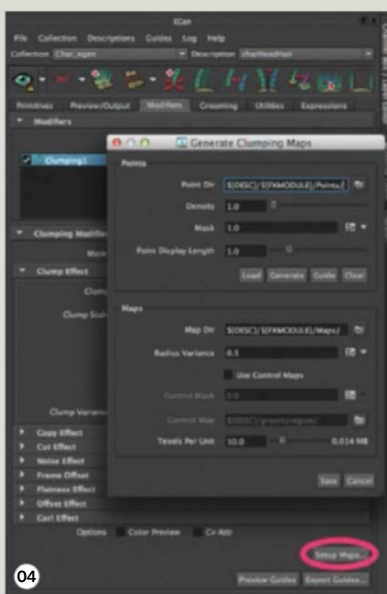
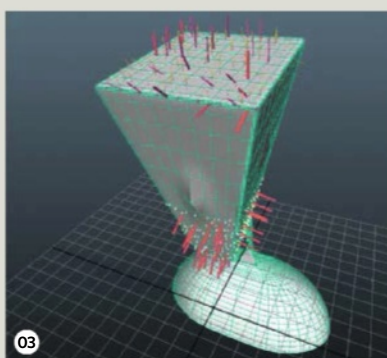
You should now see guides and interpolated hairs. Under the Grooming tab there is a list of brushes that you can use to style the hair. This is where you can really experiment and find out what each tool does. Start with the Length brush to vary the length and then use the Pose brush to push and pull the splines into the shapes that you want. There are also tools to create partings in hairstyles and to add noise, twist and smoothing.

03 Add a second description

Our character also needs some stubble on his face. You can either pick the individual faces you want the guides grown from, or you can just select the whole surface and paint out the areas you don't want selected using a map. Most controls in XGen can be toggled between a Slider, a Map or an Expression. Click the down arrow next to the Expression icon in the Mask field. When you paint in XGen, Maya will convert and save corresponding Ptex maps. The scene won't update until you click the Floppy Disk icon to save your painted Ptex Map to disk. To go back into Paint mode, press the Paint icon to the left of the Floppy icon.

04 Apply procedural modifiers

Grooming and brushing the hair into shape is just the start of the process. Once you get the guides into the shape that you want, click on the Modifiers tab. Here you will have yet another menu full of options to procedurally stack on top of your Groom. Select Clumping and click OK. Clumping needs an .XUV (points) file to be created before it can work. Click the Setup Maps button at the bottom of the window and make sure the path in the Point Dir field is pointing to a valid location on disk. Next, click the Generate button. Now you can press Save and the window should close. This will make all the hair clump by default. If you want to paint specific areas of Clumping either on or off, you will need to paint a Ptex map for the Clumping Modifier>Mask parameter.

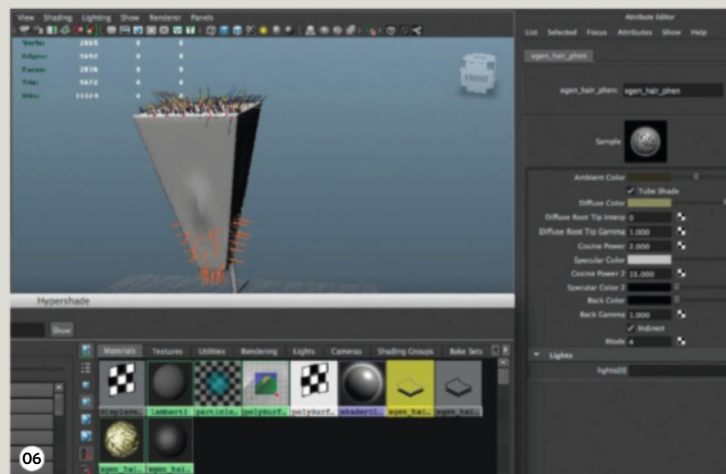
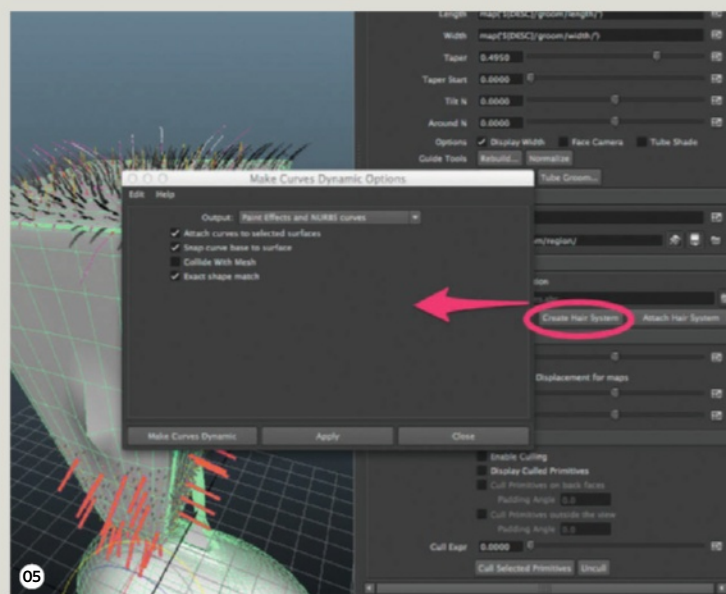


05 Export to nucleus

XGen can hook into nHair and even Paint Effects, giving you a range of options. In the XGen window under the Primitives tab, scroll down to the Guide Animation section. Select the Create Hair System button. This will open the Make Curves Dynamic window. Select your output as NURBS Curves. This will create a Nucleus node and a new Hair System that will control dynamics for the guides. Once your guides are attached to regular curves you can attach your favourite Paint Effects strokes to the new Curves. XGen also has its own built in Dynamics System that is made for things like gentle wind blowing across grass fields.

XGen vs. Paint Effects

At first glance it might seem that XGen and Paint Effects are incredibly similar. There is certainly some overlapping functionality, and like Paint Effects, XGen is incredibly powerful and complex. An easy way to start incorporating XGen into your workflow would be to make an object in Paint Effects, convert it to an XGen archive and then use XGen to do the positioning and instancing to make an entire forest. XGen's grooming tools are superior to those in Paint Effects for styling curves, while the instancing tools give you a finer level of control for adding objects to large scenes.



06 Complete the final render

XGen can output your hairstyle as a series of Primitive Curves in an Alembic cache that you can use with external renderers such as RenderMan. In this case, we'll stick with mental ray. By default, XGen should set up mental ray shaders for your hair. If it doesn't, you can set them up manually under the Preview/Output tab>mental ray Settings. To adjust the colour, specularity and texture of your hair, first open the Hypershade window. Inside you will see a new shader for each of the Descriptions that you have created. The Tube Shade button will cause the hairs to render as tubes. If you want them to be flat, then you'll need to deselect this. The fastest way to make the tubes smaller is to adjust the width setting in the XGen window under Grooming>Width.

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Photoreal rendering in LightWave

“How to achieve photorealistic renders with NewTek’s software”



The aim of CGI typically goes one of two ways. Cartoon-style entertainment, or simulating reality. It seems the larger majority are in pursuit of the latter. While many do so as a recreational activity, at the very pinnacle of the trade it enables film makers to achieve the otherwise near-impossible. Films like *Gladiator*, *Transformers* and *Pacific Rim* would have been impossible had photorealistic rendering not been a tool at the filmmakers’ disposal.

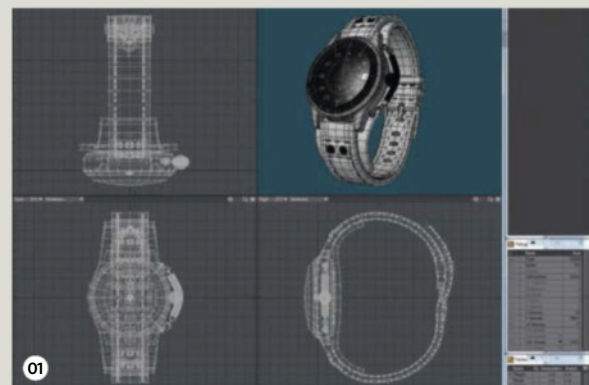
Even in advertising, often the most mundane items are not real. As much as anything, finances can be the driving force behind the use of CGI. It’s easier to re-render a CGI sequence than have photographers and all equipment to reshoot a product. In its most extreme form, we don’t even know it’s there. Gigantic sea creatures and robots are obvious, but creating invisible CGI is truly a skill.

With this article the aim is to give an overview of the key things that will help towards achieving a photoreal image in LightWave. There’s no one thing that makes something photoreal – it’s a combination of different elements. When balanced and combined, the nail is hit on the head.

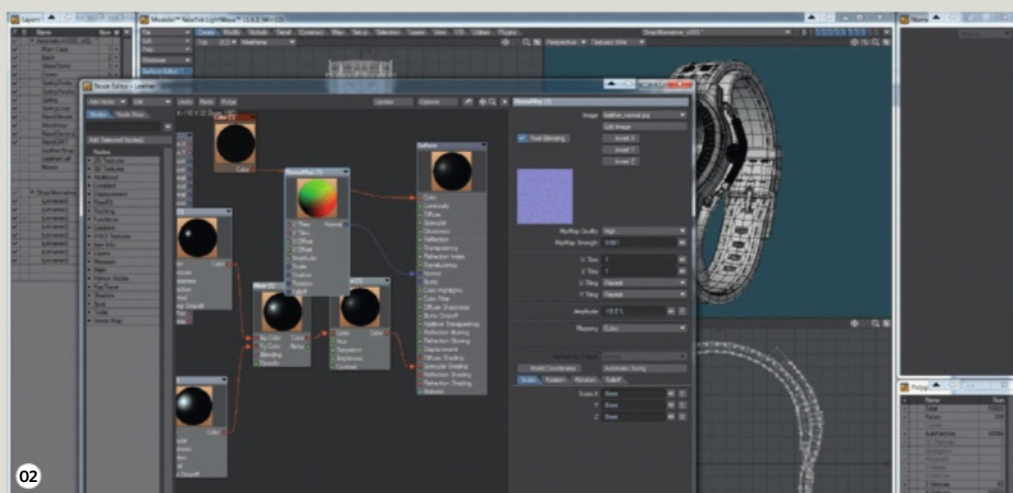
Photorealism is obviously a topic that can’t be fully explored in just six steps. While my workflow is centred around LightWave 3D, it translates across to other software systems. I have supplied the scene, objects and textures so that LightWave users can load up the scene and render it. You can tweak anything in the scene to see how it affects the output. It’s an excellent way to see how it all interacts.

01 Make the model

Part of the battle is the subject. Consider what you will or won’t see. If you won’t see it, don’t model it. If you’ll hardly see it, don’t



make a bunch of detail that simply won’t be discernible in the final render. Most photoreal renders are of real world objects, so pay attention to how they actually look, how light behaves and how the surfaces and textures appear. It sounds silly, but it’s easy to end up aiming for how you think it should look and not how it actually does.

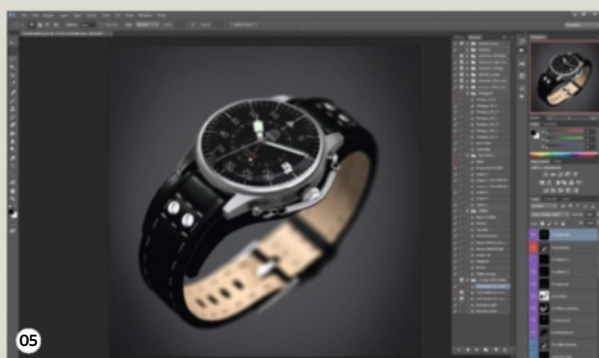


02



02 In the shade

The model is only as good as the texturing and shading. I'm a great believer in keeping things simple where possible, so I only sometimes use nodes. One of the biggest things for me is the surface textures, such as leather. I'll always recommend using a Normal map if you can, rather than a Bump map. The full XYZ information from a Normal map will provide a much more appealing interaction with the lighting, especially specific scene-added lights. The bigger the details in the Bump, the more you'll benefit from that improved light interaction, avoiding the sometimes unsightly and unsettling bright edge detail that can be seen from Bump maps.



05



03 Think real world

The clue is in the name – photorealistic. If you have an understanding of photography then you have a great starting point. If not, just look at photographs of similar subjects. Look at how the photographs are taken. In LightWave you will be setting up your camera, so replicate the real world as much as you possibly can. My watch, for example, would normally be shot with a macro lens, so I use a typical macro lens focal length of 90mm. This usually results in a shallow depth of field, so my camera will use a wide open aperture of f2.8 alongside the 90mm macro lens.

04 Let there be light

Lighting is always a major contributor to realism and you'll almost certainly use Radiosity in one form or another. One headache with LightWave is that the Image World plug-in requires a lightprobe-style image to appear correctly mapped. If you apply an HDR that is an unwrapped sphere then it'll pinch incorrectly and, while providing light, will not provide realistic reflections. In this instance I have used geometry light panels along with a mid-grey backdrop to provide the main lighting, coupled with interpolated Monte Carlo Radiosity, limited to two bounces. From two to three and beyond yields minimal gains in almost all cases.

05 Pass it on

Never take a chance on a single rendered image. I often find that what I was happy with the day before, I'll see fault with the next day. You can help alleviate this by rendering out passes. For simplicity, the PSD Exporter in the Image Processing window is excellent. You can save a .PSD with each pass in a named layer, a set of main passes layers which, when all active, provide the final rendered output, as well as a top layer with the final render for easy comparisons. Boosting reflections or subduing specular highlights is suddenly no biggie.

06 Making the grade

LightWave will give up some pretty decent renders, but for a truly realistic look, grading is the way to go. For stills, Photoshop is just the ticket. My process for grading consists of a layer for fake chromatic effects, a Color Dodge layer to boost major highlights, a noise layer, a Color Cast layer, and a vignette. The chromatic effect is a really good one to use because in real photography you avoid it at all costs and macro lenses rarely exhibit such defects, yet our eye sees the visibility of this defect as a sign of realism. You don't want to over do it though, the effect can make your eyes go pretty funny.

Useful tool information

I mentioned the use of Normal maps. For Photoshop users, NVIDIA has a toolkit that you can download and install and it will enable you to create a normal map from an image that you would have used as a Bump map. It's a great tool and I use it quite a lot when I want a normal map. It's totally free and supports Photoshop CC too. www.tinyurl.com/3DANVIDIAPS

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I made this...

Incredible 3D artists take us behind their artwork



Artist info

Mathieu Aerni

Website www.mataerni.com

Country Canada

Software used 3ds Max, MARI, V-Ray, ZBrush

Bio Mathieu is a self-taught artist from Quebec, Canada, and is the lead character artist at Blur Studio

“MARI is a very powerful software for texturing. I hand-painted the horns without using photo projection, utilising MARI's various organic brushes. I textured the face using a lot of hand-painting mixed with some photo projection”

Lindford 2013

My take on a mythical creature: the Satyr. My intention with this character was to create something that looked like a photoreal portrait, but with a mythical creature instead of a human as the subject. I also wanted to give him an interesting personality and to present a natural feel for an imaginary creature.



The Mac Pro's futuristic appearance compliments Apple's forward-thinking internal design

Apple Mac Pro (2013)

The Mac Pro is Apple's long-awaited complete redesign of its professional workstation, and it's nothing short of brilliant

REVIEW BY Orestis Bastounis, technology and software writer



It's no coincidence that Apple waited until now to launch its redesigned Mac Pro workstation.

The first Macintosh was released to much fanfare exactly 30 years ago. Then, as now, Apple was trying to appeal to digital content creators by offering a platform that wouldn't obstruct the creative process.

The Mac Pro completely goes against the established wisdom of cramming conventional components into a rectangular box. The parts have been carefully laid out in the shape of a triangle, surrounding a single large heat sink, with a series of fans drawing air from the bottom to the top and carefully enclosed in a metal cylinder.

Jokes about the Mac Pro looking like a trashcan have been made since its first unveiling, but the reality is that this is an astonishing piece of meticulous hardware engineering. The appearance is completely smooth and minimal except for a single Apple logo above the ports, which illuminate when the machine is rotated. Unless you press your ear right to the Mac Pro, it's inaudible, even after long rendering sessions. The overall design puts even the best PCs to shame.

Its hardware specification is also odd. Each model has an Ivy Bridge Xeon E5 v2 processor and dual AMD FirePro GPUs for OpenCL acceleration. ECC memory 802.11ac WiFi and PCI-Express solid-state storage are standard.

The £2,499 entry-level Mac Pro has a 3.5GHz quad-core Xeon E5-1620 v2, with optional six-, eight- and twelve-core processors. The graphics cards range from AMD FirePro D300s, each with 2GB of GDDR5 video memory, to D700s with 6GB each, which are roughly comparable with desktop FirePro W-series boards. Up to 64GB of 1866MHz ECC memory is available. The highest spec Mac Pro available comes to a substantial £7,779 (\$9,599 US).

Every component is replaceable and the Mac Pro can be easily opened, but unlike a PC you can't fit additional internal storage. Apple expects it to be used in environments where high-speed network storage capacity will be



The internal components have been specifically laid out to fit perfectly around the heatsink



An entry-level Mac Pro will set you back around £2,499 (\$2,999 US) while at the top end of the scale it will cost £7,779 (\$9,599 US)

used, via either the dual Gigabit Ethernet ports or one of the six Thunderbolt 2 ports, which can also be used to connect 4K displays. Four USB 3 ports are there for extra removable storage and HDMI 1.4 for video output.

A big market for Apple is high-end video editing, and for this purpose it's one of the best workstations around. A playback test of uncompressed 4K video samples from Blackmagic Design wouldn't play using VLC from the SSD in our test PC workstation, but the 968MB/sec PCI-Express SSD in the Mac Pro had no trouble reading the data.

But for 3D, the Mac Pro's superiority over PCs is less obvious. Firstly not all 3D software is available for OS X, most notably 3ds Max. Also, the restriction of FirePro cards over Nvidia Quados means software such as Adobe After Effects, which relies on CUDA acceleration rather than OpenCL, has to use the CPU alone. The FirePro cards in the Mac

Pro are certainly fast, but with a PC you get a greater variety of choice.

Additionally, software needs to be updated before it can fully utilise both cards in the Mac Pro at once. We expect all OS X design packages will be optimised to support OpenCL with the Mac Pro's dual GPUs in time, but this is not the case yet.

However, MARI is one 3D package that already does. Tested with a highly detailed 5.5 million-triangle scene created by Brandon Fayette of Bad Robot, we compared load times against MARI on other PC workstations. The Mac Pro beat them hands down.

Although the Mac Pro is expensive, ECC memory and PCI-Express storage account for much of that cost, and Intel's Xeon E5 processors aren't exactly cheap. The dual GPUs work out better value than when purchased as desktop cards in a PC, so the Mac Pro is fairly good value for money against a PC with a similar specification.

This is undoubtedly the ultimate workstation for existing OS X modellers and is a great upgrade from the previous generation. But while it's fast, it's actually not the fastest 3D system ever made, and might not be right for every artist who's heavily invested in Windows. However, the cool and silent operation while under heavy load points to great long-term reliability, which for many is the most important consideration.

The Mac Pro is absolutely incredible, from its beautiful design to its performance in OS X. It's undoubtedly a five-star machine. However, if you do buy one, take note that it doesn't come with a three year warranty or a wireless mouse and keyboard. These cost extra, and in the case of the warranty and Apple-specific keyboard, are highly recommended. Also if you want to run Windows via Bootcamp on the Mac Pro, as of writing, Apple only provides drivers for Windows 8.

Essential info

Price: From £2,499 / \$2,999 US

www.apple.com/uk/mac-pro

OPERATING SYSTEMS

- OS X 10.9 (Windows 8 supported via bootcamp)

TECHNICAL SPECIFICATIONS

- Quad-core Intel Xeon E5-1620 v2 (3.5GHz)
- 12GB DDR3 ECC memory
- Dual AMD FirePro D300 GPUs
- 258GB PCIe-based flash storage
- 802.11ac Wi-Fi
- HDMI 1.4 UltraHD



Each of the six Thunderbolt 2 ports allows up to 20 Gbps of bandwidth and can support eight devices

The good & the bad

- | | |
|----------------------------------|---|
| ✓ Dual AMD FirePro GPUs | ✗ No dual-CPU options available |
| ✓ Intel Xeon v2 processors | ✗ No internal storage expansion |
| ✓ Extra-fast PCI-Express storage | ✗ OS X not universally supported by 3D software |
| ✓ ECC memory | ✗ Applecare warranty, keyboard and mouse not included |
| ✓ Beautiful design | |

Our verdict

Features 9/10
Performance 9/10
Design 10/10
Value for money 9/10

“The Mac Pro is a great workstation that offer extremely fast storage and excellent CPU and graphics capabilities”

Final Score 9/10

The M3800 squeezes enough performance for high-end 3D rendering into a light mobile chassis



Dell Precision M3800

High-performance mobile rendering in a slim package

REVIEW BY Orestis Bastounis, technology and software writer



Dell's latest 15-inch mobile workstation is a welcome change from typical portable modelling systems. It has plenty of

performance: a Haswell-based Core i7 processor, an Nvidia Quadro graphics card and up to 16GB of memory. But it's also surprisingly portable, measuring 18mm with the lid down and weighing just 1.9kg, something of a relief for anyone who regularly struggles with a 17-inch rendering monster.

That's not the only trick up its sleeve. It has a touch-sensitive QHD+ resolution display, measuring a gigantic 3200x1800 pixels. As with the Retina display in Apple's MacBook Pro, at this resolution text and graphics are crisp and sharp, with an overall effect that is subtly superior to lower-resolution screens.

The slim design of the M3800 means there's no room for an optical drive or ethernet port. A USB-to-ethernet adaptor is

included, and the Windows recovery files are bundled on a USB stick rather than a DVD. There are four USB ports, three of which are USB 3, plus a DisplayPort, HDMI port and battery life indicator at the sides.

The build quality is sleek and solid, as you would expect from Dell. The lid is made of a silver-grey aluminium with a carbon-fibre base. A black chiclet keyboard is surrounded by a soft material that makes typing comfortable and there's a large trackpad that supports multi-touch gestures, such as swiping two fingers up and down to scroll through a webpage.

Rendering software runs particularly well. The Core i7 4702HQ quad-core processor, which is included with all models of M3800, has a default clock speed of 2.2GHz which rises to 3.2GHz when Turbo Boost kicks in. Likewise, a second-generation Kepler-based Quadro K1100M is standard, with a similar

specification to the older K2000M, with 2GB of memory, a 128-bit bus and 384 shaders, but also a few welcome improvements such as a 10-watt lower TGP and faster memory.

The benchmark results prove what a capable machine the M3800 is. 3ds Max renders completed within 10 per cent of the time managed by a 3.5GHz desktop Core i7 3770K, with a Cinebench CPU score that was similarly within reach of entry-level desktop workstations. The K1100M also proved its worth, managing scores in SPECviewperf that point to 3D performance comparable with thicker and heavier 15-inch laptops.

With an Intel 802.11ac wireless networking adaptor and either 256GB or 512GB of solid-state storage, plus the option of a 500GB hybrid hard disk, the Dell Precision M3800 would be the perfect portable rendering machine if it weren't for two issues. The first is poor battery life, since it only



When software supports the Hi-DPI display it looks gorgeous, but if not then the text can be hard to read

Essential info

Price: from £1149 / \$1854 US
www.dell.com/uk/business/precision-m3800-workstation/pd

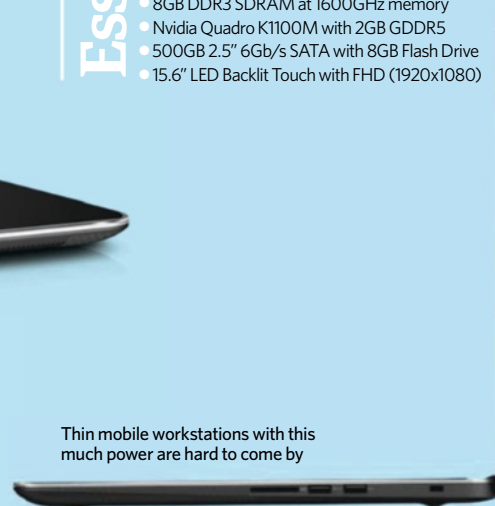
OPERATING SYSTEMS

- Windows 8.1 Pro

TECHNICAL SPECIFICATIONS

- 4th Generation Intel Core i7-4702HQ processor (up to 3.20GHz)
- 8GB DDR3 SDRAM at 1600MHz memory
- Nvidia Quadro K1100M with 2GB GDDR5
- 500GB 2.5" 6Gb/s SATA with 8GB Flash Drive
- 15.6" LED Backlit Touch with FHD (1920x1080)

Thin mobile workstations with this much power are hard to come by



Dell's sleek aluminium looks scream professionalism

The good & the bad

- | | |
|--------------------------------|--------------------------------------|
| ✓ Thin and light | ✗ Display scaling problems |
| ✓ Very powerful CPU | ✗ Short battery life |
| ✓ Powerful GPU | ✗ Lack of ethernet and optical drive |
| ✓ Hi-DPI display | |
| ✓ 802.11ac wireless networking | |

lasted 2 hours 58 minutes during HD video playback. The second is that the text and graphics don't look right on the super-high resolution display.

With the DPI increased in Windows 8.1, all text used in the operating system looks normal. But with many third-party applications on the Windows desktop, the interface is drawn at the same standard size no matter what DPI setting is used. This results in unreadable text, difficulty even clicking on some of the buttons, and a sub-par experience. The large DPI settings

mean that some interface elements are pushed out of place.

There's so much to love about the M3800, especially its performance, that this oversight becomes a massive disappointment. It doesn't affect every software application, but still crops up relatively often.

Reducing the desktop resolution is one way to deal with this situation. Trying before buying is a better suggestion though, because if the software you use looks fine and you don't mind the short battery life, the M3800 is one mean laptop.

Our verdict

Features	8/10
Performance	9/10
Design	9/10
Value for money	7/10

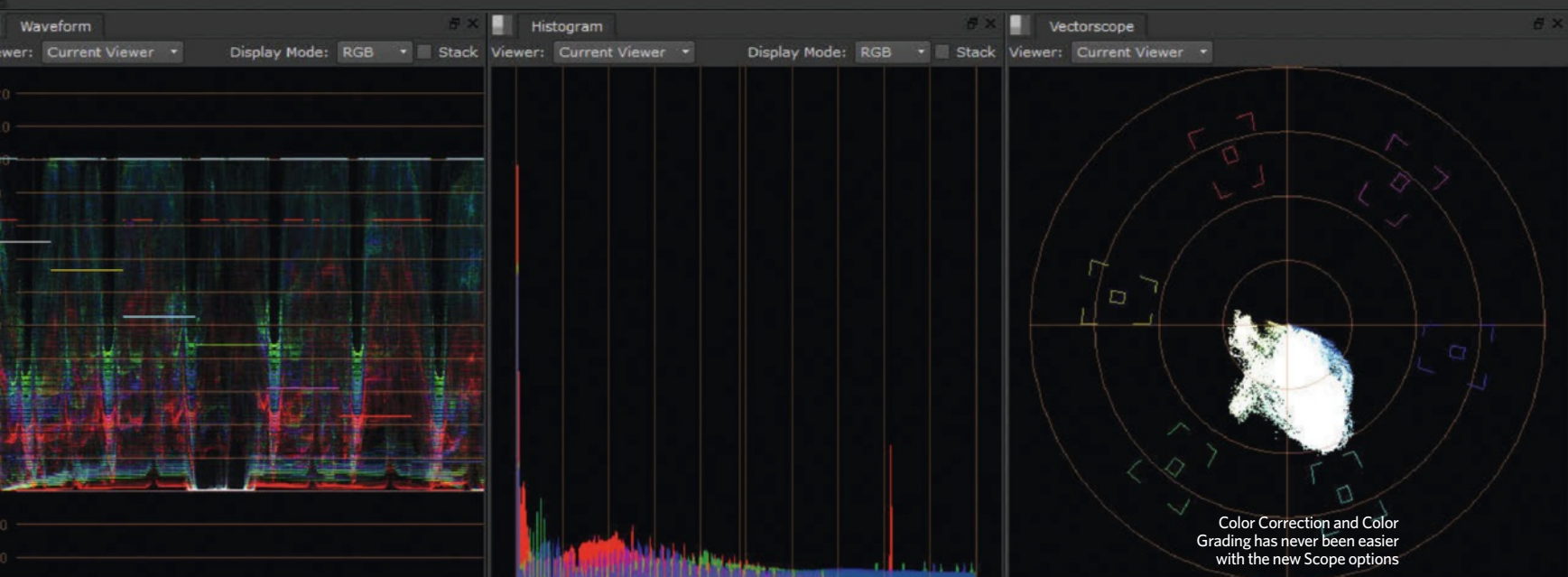
“The M3800 fares well against its larger competitors, but the battery life and unpredictable display really let it down”

Final Score 8/10



280x720 bbox: 0 0 1280 720 channels: rgba

x=1579 y= 246



NUKEX 8

Dave Scotland takes the exciting new release of NUKEX out for a serious test drive

REVIEW BY Dave Scotland, CG tutor



When the web starts buzzing about an exciting new update for one of my beloved software applications, I get nervous. I've

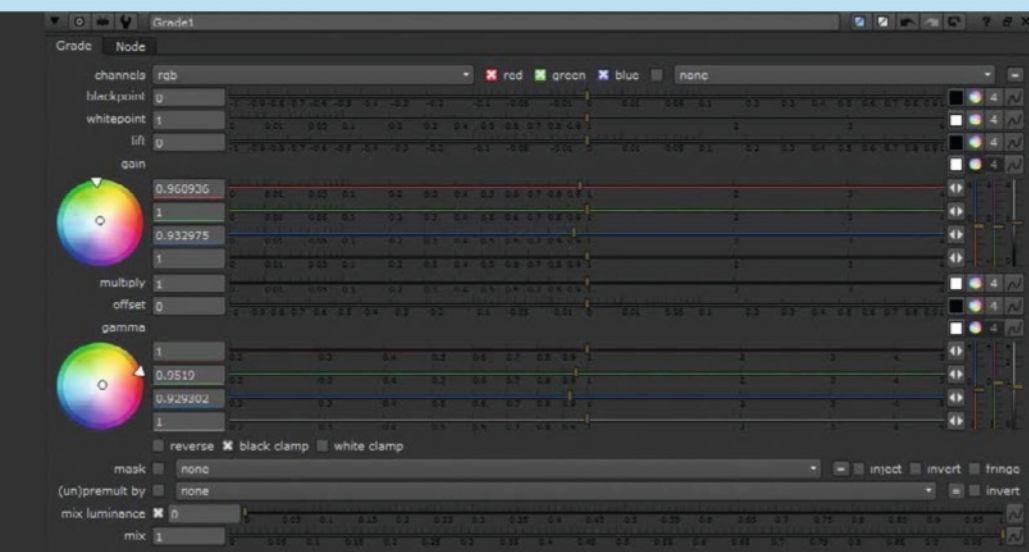
been burnt in the past. Broken promises of more feature and better functionality have all too often resulted in disappointment. So, when asked to review NUKEX 8, I took the opportunity to really put it to the test, using

shots from a recent short film project to see if the new features were all they promised to be.

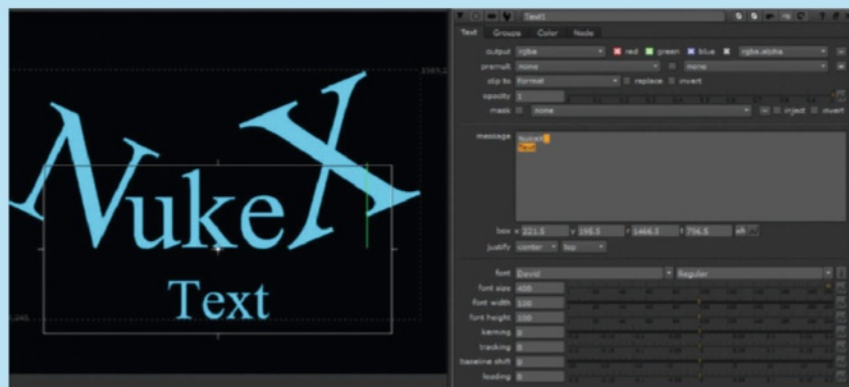
The first new feature worth exploring is the hotly anticipated Match Grade node. As the name suggests, you can match the colour grade from one footage source and automatically apply it to another. You can even bake the result into a 3D .LUT file, which can be distributed to other artists.

The new Scope system is impressive. It enables you to assess colour using various modes of visual representation. These include the Histogram, Waveform and also the Vectorscope. Similarly, the new Pixel Analyser is useful, letting you assess pixel values on a per-pixel basis or as a full-frame selection.

In previous NUKE versions, while editing colour you could click on a small colour wheel



In-panel colour wheels remove the need for opening and managing an entirely new window



The new Text features in Nuke 8 will certainly keep the motion graphics artists among us very happy

icon and a new window containing various controls and sliders would open. This has been replaced with an in-panel colour wheel built into the main properties for the node. While there are benefits for this new feature, personally I still prefer the old style, especially if you're running a high-resolution desktop.

A welcome addition, especially if you're a motion graphics artist, is the revamped Text node. Now you can add and edit text right in the viewer. The node comes with a full range of controls and even offers the option for animation on a per-character basis. While on the subject of animation, the Dope Sheet has also been totally redesigned, resulting in a much improved animation workflow.

In the previous version of Nuke, there were huge improvements to the 2D tracking system. In this version developers have focused on the 3D Tracker and they have certainly delivered. While tracking footage, there was a noticeable reduction in error rates, resulting in tighter camera solves. Aside from this, there are also a number of new track export options. The one that comes across as extremely valuable is the Scene+ export, which gives you all the nodes to start a camera-track-based 3D setup.

For anyone interested in Deep Compositing, there is an exciting new addition to Nuke 8. Now you can generate Deep data directly from the 3D Scanline Renderer node. This is a huge development and, if used correctly, can help with large file sizes and offer more creative options. You can even use this Deep data to drive various other nodes like the ZDefocus, resulting in a very fast and accurate depth of field blur.

Under the hood there have been a lot of improvements and the stability of the application has certainly improved. Python has been upgraded to version 2.4.7 and there is also a new feature called the Blink Script – like Gizmos on steroids.

But the feature that really stands out in this release is the brand new context-specific help system. If you need information relating to a specific function, simply click the question mark icon in the properties panel and you are presented with an online help page, detailing not only the function, but also offering step-by-step guides, tutorials and various related topics. This help system will assist new users to learn the software much faster. It will also aid existing users to better understand specific techniques and functionality.

Essential info

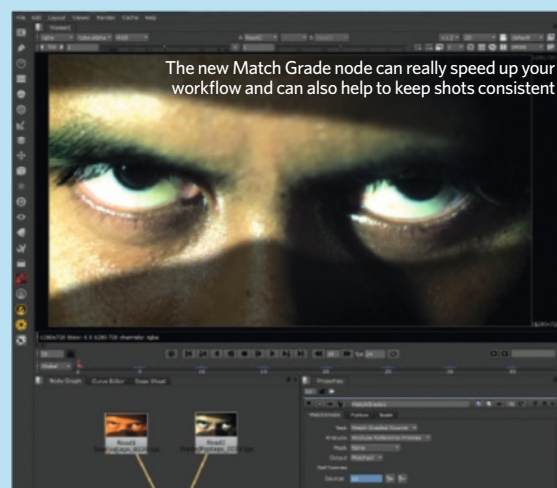
Price: £4882 / \$8144 US*
www.thefoundry.co.uk

OPERATING SYSTEMS

- Windows 7 or Windows 8 (64bit)
- Mac OSX 10.7 (Lion), 10.8 (Mountain Lion), 10.9 (Mavericks) (64bit)
- Linux CentOS/RHEL 5 and CentOS/RHEL 6.4

OPTIMAL SYSTEM REQUIREMENTS

- x86-64 processor, such as Intel Pentium 4 or AMD Athlon, with SSE3 instruction set support (or newer)
- 5 GB disk space available
- At least 1 GB RAM
- Display with at least 1280 x 1024 pixel resolution and 24-bit colour
- Graphics card with at least 512 MB of video memory and driver support for OpenGL 2.0



The good & the bad

- | | |
|------------------------------------|------------------------------------|
| ✓ The intelligent help system | ✗ In-panel colour wheel fixed size |
| ✓ New and improved Camera Tracking | ✗ An expensive piece of kit |
| ✓ Full-frame player buffer | |
| ✓ Particle Cache | |
| ✓ New Text functionality | |

Our verdict

Features 9/10
Ease of use 8/10
Quality of results 10/10
Value for money 7/10

“A fantastic update, perfect for new users and veterans alike”

Final Score 9/10



The name for Arnold was inspired by the particularly brilliant impersonation made by visual effects wizard Andy Lesniak of Arnold Schwarzenegger himself

Arnold for Maya

For the first time, the increasingly popular Arnold renderer has been made available to the public

REVIEW BY Larissa Mori, 3D Artist magazine



If you were to name one of the many different rendering solutions available today as the most fashionable, it would likely be Arnold. Originally developed by Solid Angle founder Marcos Fajardo in 1997, Arnold was ultimately licensed by Sony Pictures Imageworks and used as a primary renderer for its features. Today, it has become part of the render roster at over 250 studios worldwide including ILM, Framestore, The Mill and Digic Pictures, and used on films as diverse as *Pacific Rim*, *Gravity* and *Cloudy With A Chance Of Meatballs*.

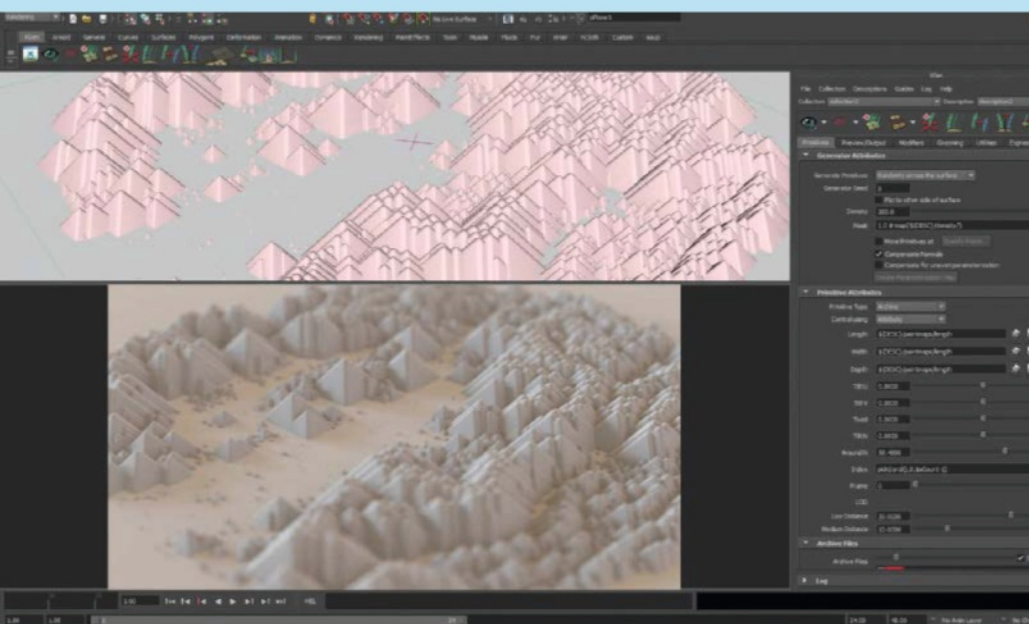
For a long time Arnold has not been publicly available, which has been something of a disappointment to artists the world over. Solid Angle cites its difficulties as a small developer in supporting a large customer base as the reason behind this. However, the

company has now changed its stance. Along with an eye-catching new website, Solid Angle has also made Arnold available to try for free. The free version is functionally identical to the commercial version with a trial license that lasts for 15 days, and it will continue to work even once the license expires. The only change will be the inclusion of a watermark.

Arnold presents an unbiased, physically based, path-tracing 3D rendering application at the forefront of an industry-wide trend towards a more physically based shading and lighting model. With path tracing, Arnold doesn't use caching algorithms that introduce artefacts like photon mapping and final gather, both of which take up large amounts of memory and require a deep technical understanding in order to correctly modify the settings. With a physically based model,

artists can work in a physically accurate workflow, which means that the process of completing a scene is more akin to how a real scene would be lit and photographed.

This attention to simplifying the pipeline is immediately noticeable as soon as you start experimenting with the Arnold for Maya plug-in. It has a reduced set of interface elements and seems to be far more artist-friendly overall, which is crucially important when artist hours are so much more expensive than render hours. For every object in the Maya scene there is an Arnold tab to help control render settings. The plug-in even has elements such as a Feature Overrides control, which enables you to disable particular elements such as the textures, lights, SSS and so on, making it very fast and easy to troubleshoot for issues within each component of the render.



As you increase a value such as the Camera (AA), remember to decrease the Samples values underneath it such as Diffuse, Glossy or SSS. This will help to achieve a clean render more quickly



The new character animation toolset (CAT) makes producing and animating character rigs much simpler

Arnold for Maya has a Features Override tool, enabling users to disable certain functions

The reduction to the amount of tweaks and workarounds an end user needs to implement in order to get a realistic render comes at a price, however. Though Arnold is considered by many to be the fastest production renderer available for many styles of projects, there is comparatively little that artists can easily tweak to fully optimise the render speed – something that can become frustrating if you're used to other solutions. Even so, take the time to learn Arnold – and it's not overly difficult – and solutions to decrease render time will gradually reveal themselves.

The most crucial thing to remember is to properly balance the samples in the scenes, working your way up by increasing them from bottom to top. The Camera (AA) Samples alone will be the equivalent of the Camera (AA) value multiplied by itself, so these can get high quickly and therefore increase render

times. Other methods include converting any images used in the scene to the .TX format, which also greatly speeds up render times in Arnold. This can be done easily in Maya itself with the Arnold TX manager.

Overall, rendering with Arnold was very impressive. It worked smoothly with Maya's IPR viewport as well as Maya lights and other native elements. The Global Illumination was fast and efficient and it was very easy to learn how to improve renders using the simplified interface and Solid Angle tutorials. It's worth noting that though the price may seem expensive to individual users or smaller companies, Solid Angle boasts a reputation for having a strong commitment to R&D and is held in high regard for sharing and publishing its continuing work in developing the renderer. It will be exciting to see how it continues to improve in the future.

Essential info

Price: Free to try, permanent cost of £875 plus £200 maintenance or £5 a day / \$1300 + \$300 or \$8.50 a day US

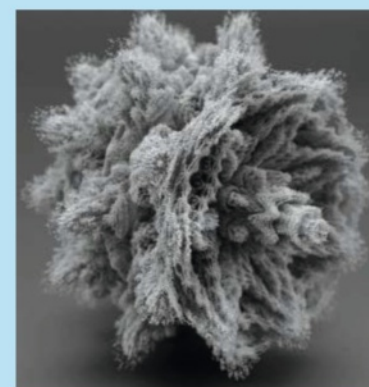
www.solidangle.com/arnold

OPERATING SYSTEMS

- Cross-platform (Windows, Mac OS X, Linux)

OPTIMAL SYSTEM REQUIREMENTS

- Not available at time of printing



Solid Angle was born in 1997 when founder Marcos Fajardo had the realisation that a Brute Force path tracing solution to the rendering equation could be optimised to produce previously unattainable imagery

The good & the bad

- ✓ A powerful and fast renderer, very production-proven in the industry
- ✓ Designed to speed up workflow and give more simplicity to the artist
- ✓ Memory efficient
- ✓ Physically accurate workflow, more like how a real scene would be shot
- ✗ Fewer options for workarounds to optimise render times
- ✗ Expensive for individuals and smaller companies – for permanent license sales there is a minimum order of five
- ✗ Doesn't offer as much flexibility for the more technically-minded

Our verdict

Features 9/10
Ease of use 9/10
Quality of results 10/10
Value for money 8/10

“Arnold is a beautifully designed, powerful renderer that is very easy to learn in Maya”

Final Score **9**/10

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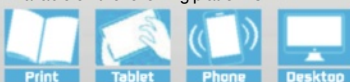


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We find out how Big Lazy Robot found the time and money to create its latest in-house shorts

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Bre Pettis

From schoolteacher to CEO of MakerBot, 3D-printing pioneer Bre Pettis describes his incredible experiences

inside

“It takes a lot of guts to turn down juicy commercial projects because you really want to focus on doing something you believe in”

Leopoldo Palomo head of production at Big Lazy Robot. Page 108

Keloid

Big Lazy Robot

We talk to Big Lazy Robot about taking the time away from commercial work to produce personal in-house projects

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Even the traditionally 2D-based Photoshop cannot ignore the continual rise of the 3D printing industry

3D printing update to Adobe Photoshop CC

Adobe unveils new 3D printing capabilities in its major update to Adobe Photoshop CC

Adobe has revealed that a major update to Adobe Photoshop CC will include new 3D printing capabilities, with an aim to radically simplifying the 3D printing process. The company has stated that Photoshop CC will become the go-to tool for anyone who wants to print a 3D model, with new capabilities that will enable Creative Cloud members to easily and reliably build, refine, preview, prepare and print 3D designs, setting the stage for even further growth in the 3D printing market.

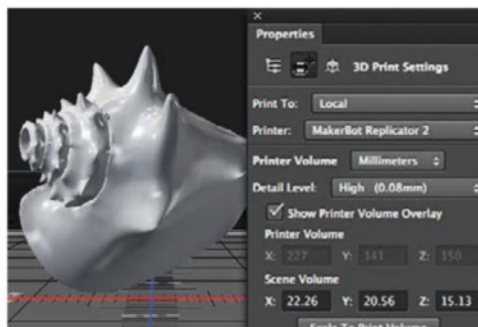
Users will be able to create their models and designs from scratch with the 3D Photoshop tools that are already available, or import them from another software package or 3D scanner. They can then use the standard Photoshop toolbox to add colour and texture to the models before printing. The update will also focus on the quality of the prints themselves, with automated mesh repair and support structure generation as well as accurate previews to deliver better print jobs.

Built-in support has also been added for direct 3D printing from Photoshop to popular 3D printers such as the MakerBot Replicator, as well as the Shapeways online community and marketplace. This will include the ability

to print in the full range of materials available such as ceramics, metals and full colour sandstone. Photoshop users can also directly upload their 3D models to the Sketchfab 3D publishing service or embed them in their Behance profile using Sketchfab's interactive 3D viewer.

If you want to find out more about Photoshop CC, visit both www.adobe.com/uk/products/photoshop and <http://tv.adobe.com/go/21862>

To find out more about the new Adobe Creative Cloud release, visit <http://tinyurl.com/3DAAdobePrinting>



Photoshop's new 3D printing abilities enable users to design from scratch or refine an existing model using familiar tools

MeshFusion for MODO

The Foundry launches its new plug-in, enabling users to create faster models

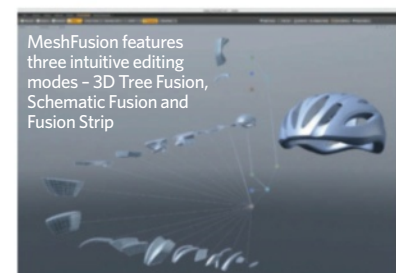
Developed by Braid Art Labs based on previous GroBoto technology, the hotly anticipated MeshFusion for MODO promises to make the process of producing high quality models much more consistent.

Available exclusively for MODO 701 SP4, the plug-in enables existing objects to be interactively added, subtracted, or combined to other objects to create a resulting model much faster and more accurately. Users can control the blending between the final surfaces, edit assembly instructions with greater creativity, use the plug-ins with deformers and other MODO modelling tools, and export the final mesh output as a single unified mesh ready for further editing or on to .STL for 3D printing. It has now been released by The Foundry at a special introductory price of £199 (\$295 US).

The feature list includes:

- Interactive live booleans based on Catmull-Clark subdivision surfaces
- Works with MODO's full slate of modelling tools
- Editable Fusion Strips (edge loops) that automatically blend surfaces along boolean intersections
- Easy click-haul editing
- Watertight mesh export to .STL
- Convert to MODO meshes for further modelling and/or retopology
- Ability to animate and render live boolean connections
- Custom '3D Boolean Tree' UI with drag and drop editing directly in the 3D viewport

To find out more, visit www.thefoundry.co.uk



V-Ray 3.0 for 3ds Max

Chaos Group launches the latest version of its lighting, shading and rendering toolkit for 3ds Max

After having announced the Beta program last September, Chaos Group has now launched V-Ray 3.0 for 3ds Max. The company has said that the release will continue its goals of making speed and simplicity accessible to all artists, with significant optimisations to the ray tracing core that allow for Brute Force GI, Progressive Path Tracing, Reflections, and Refractions to run up to five times faster than before.

Other improvements include advanced Subsurface Scattering, with options for object-based and ray traced illuminations; hair rendering speeds that are up to 15 times faster than



V-Ray's new interface has been designed with minimalism in mind. Artists are now able to select three basic UI modes – Basic, Advanced, and Expert – to better match their own preferences

previously; and a dedicated Skin Shader with layered reflections.

You can see more information and read a complete list of all new features at www.v-ray.com

3D printed houses

Could Contour Crafting change housing forever?

The University of Southern California's Professor Behrokh Khoshnevis is developing Contour Crafting, a layered fabrication technology that has the potential to build houses. Using this process the emissions currently created through construction would be reduced, as large-scale parts are fabricated in a layer-by-layer fashion.

By using robotic arms, extrusion nozzles and a computer-controlled gantry system, Contour Crafting could be used to construct a colony of houses, each with a different design and constructed in a single run, with elements such as conduits for electrical, plumbing and air conditioning already embedded.



Research has also addressed the application of the technology in building habitats on other planets

Faceware and Vicon unite

Faceware Technologies joins forces with Vicon



Discussions on additional integrations between the two firms' hardware and software solutions are currently taking place

Faceware Technologies, a leader in markerless 3D facial motion capture solutions, has announced that it has entered into a partnership with motion capture technology specialist, Vicon. Faceware has made its software products, Analyzer and Retargeter, compatible with Vicon's Cara head rig – the world's first out-of-the-box 3D facial motion capture system. When used in a single-camera configuration, a team capturing facial performance data using Cara will now be able to process and retarget the data onto 3D characters using Faceware's products.

For more information, visit www.facewaretech.com

Software shorts

Bringing you the lowdown on product updates and launches

Arnold Trial

SOLIDANGLE

Arnold developer

SolidAngle has just made the latest version of its advanced Monte Carlo ray tracing renderer available to the general public as a 15-day trial. The free trial version is functionally identical to the commercial version and will still work after the offered 15 days, though it will then only generate watermarked renders. Find out more about Arnold at www.solidangle.com/arnold/try

Amplify Texture 2

AMPLIFY creations

Amplify Creations has announced

Amplify Texture 2, the update to its Unity extension that allow artists to use virtually unlimited amounts of textures per-scene. Amplify Texture 2 will take full advantage of the improvements introduced in Unity 4, with higher resolutions supported, better compression and support for multi-tille UVs. For more information, take a look at the website at www.amplify.pt/unity/amplify-texture-2

Fuse

Mixamo has released Fuse, a



new data-driven tool that offers a new approach to modelling custom 3D characters for animation. The free character creator allows users to browse through a vast number of mesh and texture choices to get customised, rigged characters in a matter of minutes. To learn more about Fuse, take a look at www.mixamo.com/c/create-custom-characters

Cinesite in Montreal

The London-based visual effects company is expected to create 200 jobs in the city



The move will enable the studio's clients to take advantage of Canada's tax incentives

Québec Premier Pauline Marois visited visual effects house Cinesite in London to make the official announcement that Cinesite are opening up a subsidiary in Montréal, expanding their capacity. The new high-spec studio will

cover 26,000 square feet and will be large enough for 250 artists. The facility will operate under a unified pipeline between London and Montréal, with connectivity provided by Sohonet. The first project to be completed at the new location will be the Guy Ritchie film *The Man From U.N.C.L.E.*, for Warner Bros.

Project Focus

Forensic art

Philippe Froesch sheds some light on the processes he uses to create lifelike CG reconstructions of famous historical figures



Project '3D Facial Reconstructions'

Description The goal is to produce full HD 1080p pictures and animated sequences of 3D facial reconstructions for museums, TV shows or printing. VISUALFORENSIC also work as consultants for facial identification.

Company VISUALFORENSIC

Country Spain

Software used ZBrush, CINEMA 4D, V-Ray

Contributors



Philippe Froesch

Director

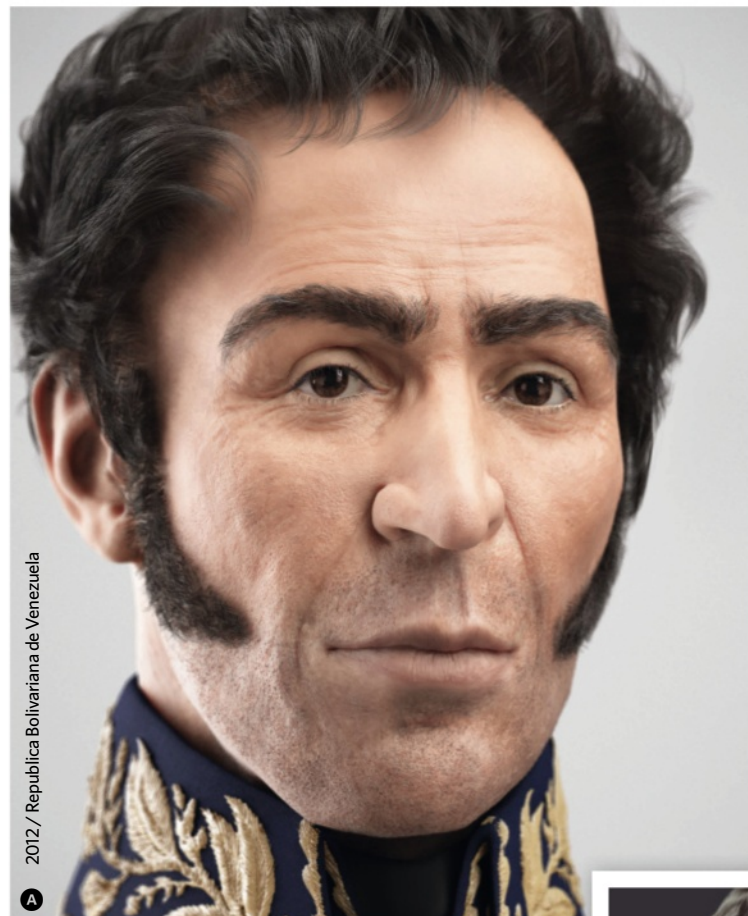
Bio Froesch is director of VISUALFORENSIC. After receiving his Bachelor's Degree in Art from École des Beaux Arts de Nantes, he began working in architecture with some of the first 3D software that existed. After several years he moved to Barcelona, where he began working in 3D facial representation – his background helping him to achieve incredibly realistic facial renders.

As far as most history books are concerned, the best way to visualise what people may have looked like before the invention of photography can only be achieved by looking at sculptures or portraits from the past, even though the artist may have used a lot of artistic license in their work. For Philippe Froesch, director of Barcelona-based studio VISUALFORENSIC, art has now evolved. Today it can be used to produce a far more realistic representation of the same past kings or military leaders – all by using 3D facial reconstruction techniques from the CT scans of their remains.

"The current workflow consists of importing databases from scans into CINEMA 4D or ZBrush, and to then place soft tissue markers upon the bones," begins Froesch. "When the muscles and flesh are in position, we begin with the sculpting, texturing and rendering workflow with V-Ray for C4D. Close collaboration with historians, forensic scientists, pathologists, anthropologists and odontologists is essential at this point if you want to achieve serious results, as they validate the workflow."

With so many scientists on hand to help, it's no surprise that the studio's work is always based on serious scientific protocols – to reconstruct the nose alone, the regressive equation technique by Rynn, Wilkinson and Peters is used. However, artistic decisions about the final look of each reconstruction will also be made by consulting a variety of elements – from written descriptions of the historical period to thinking about diet, illness, living conditions and even the lighting of the environment, ensuring that the renders are as accurate as possible.

"The challenges are always related to being able to render a credible face, and that's a really hard thing to



achieve," continues Froesch. "A face seen from distance is much easier to sculpt and render, but when it comes to extreme close-ups in 3D, suddenly it all becomes more difficult. All you need is for there to be a strange eyelid or an excessive crease on the forehead and it will be detected by the public for sure."

Despite these difficulties Froesch tells us that working in 3D also provides many advantages as compared to more traditional reconstruction techniques. "Working in 3D allows us to make quick changes on the skin topography when necessary, or more easily present an 'écorché' of the reconstruction, potentially animated and with various lighting schemes," he explains. "And we can 3D print now. Even if problems do arise, this allows us to mix reconstruction techniques."

“Success is when the public thanks you for having been able to make eye contact with someone from the past”

Philippe Froesch, Director of VISUALFORENSIC

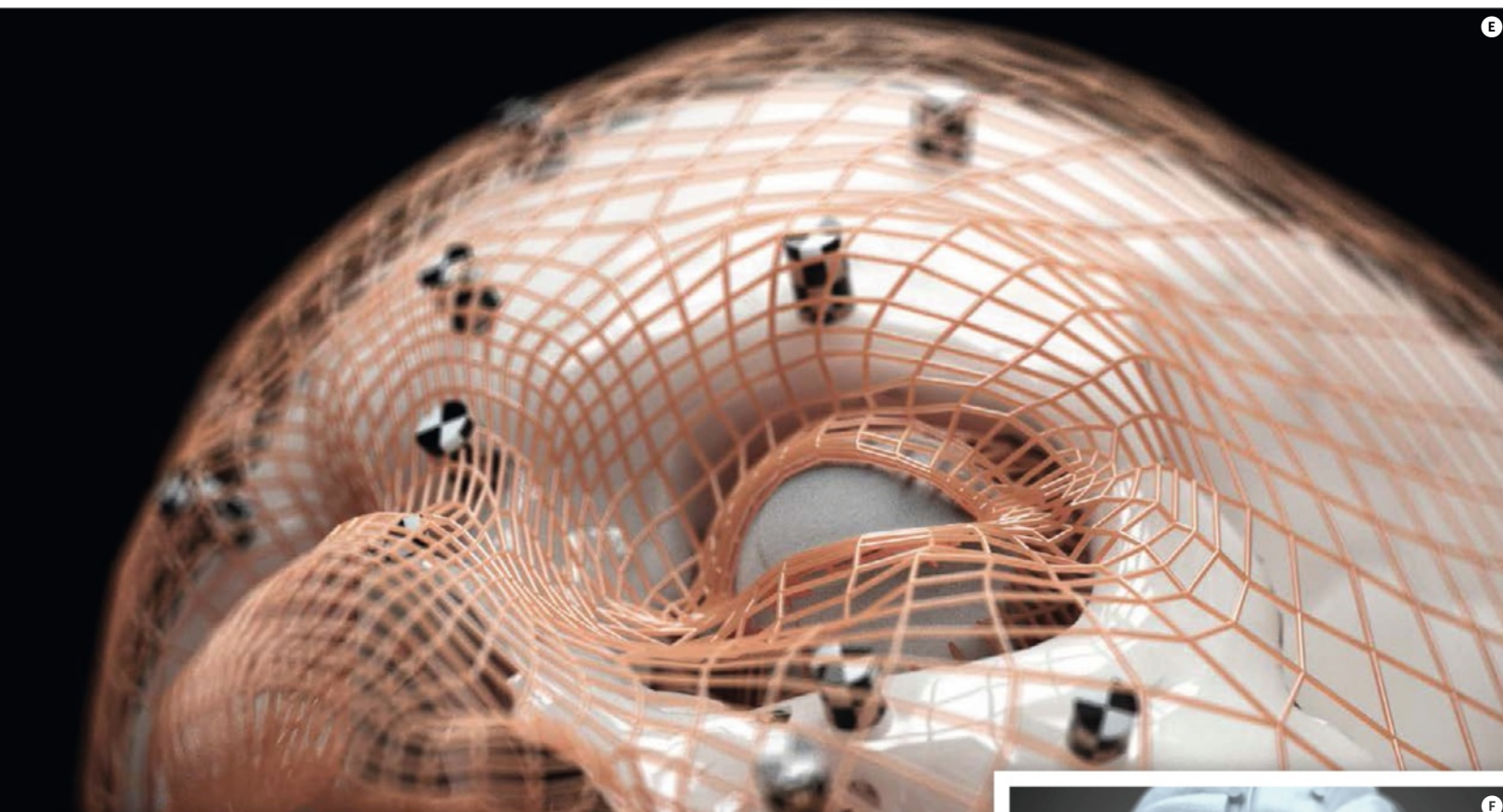


A "The goal for this year will be to simplify the work pipeline without losing quality. We want to be able to reduce the production time on new creations while still maintaining top quality using the shaders we know best," says Froesch

B Reconstruction of Peter III of Aragón. This 2010 reconstruction was created under the direction of the Catalan Museum of History in Barcelona, and is based on CT scans of the remains found in Catalonia's Santes Creus monastery

C Forensic Anthropologist Dominika Nociarova is Froesch's collaborating partner, helping him analyse the scientific needs of every case. "Obviously scientists and artists need to work together to get the optimum results," says Froesch

D This facial reconstruction of Henri IV began in September 2012 when the VISUALFORENSIC team first got access to the mummified head CT scan of the king. The reconstructed head, which is in full HD, was first presented in February 2013

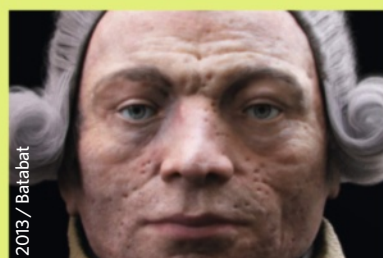


Reconstructing Robespierre

The new discoveries made during the VISUALFORENSIC reconstruction of Maximilien Robespierre's facial features

The facial reconstruction of Maximilien Robespierre was based on the plaster print taken of his face in 1794. VISUALFORENSIC digitised the mask and opened the eyes by looking for the cornea mark left on the superior eyelid on the mould. The 3D face was rendered with Image Based Lightning using a 360° HDRI photograph of a street in Paris. The team also detected bags under his eyes, revealing that the man, executed by guillotine in 1794, was physically tired.

The plaster face used for this production is now located in the Museum d'Histoire Naturelle d'Aix-en-Provence, France.



2013 / Batabat



So far, Froesch has re-created the faces of Henri IV, Maximilien Robespierre, Simón Bolívar and a Homo georgicus. His work at VISUALFORENSIC is regularly published in national and international papers and, of course, today's history books.

This year Froesch is working as co-producer for a TV programme which aims to involve rendering natural-looking faces in movement. "The interesting part of this job emerges when science mixes with art," he tells us. "Success is when the public thanks you for having been able to make eye contact with someone from the past. That happened in Paris during the presentation of the face of former French King Henri IV, who was killed in 1610."

❶ To make sure every reconstruction is as scientifically accurate as possible, VISUALFORENSIC collaborate with the Autonomous University of Barcelona as well as collaborating with the medicine faculty of Barcelona

❷ This reconstruction is based on a NextEngine scan from skull n° D2700 discovered in Dmanisi, Georgia. Skulls and several near-complete skeletons have been found, which have been reliably dated back to almost 1.8 million years ago

Studio Access

The robot-creators

The Big Lazy Robot team discuss taking time out to create their dream in-house projects



BLR is a post-production studio devoted to creating a smooth transition between what's real and what's not. The studio aims to develop any person's visual needs that cannot otherwise be generated in the real world

www.biglazyrobot.com

Country Spain

Main software used 3ds Max, Maya, V-Ray, NUKE

If you can think of it, we can do it", says the slogan at Barcelona-based VFX Studio Big Lazy Robot. When CEO JJ Palomo first opened the studio in 2006, the idea was to set up a team of talented professionals that all shared a vision and passion for unique concepts. Today, the artists have produced visuals for clients such as Phillips, Mercedes and Absolut, but pride themselves on putting their own personal style into everything they do. "JJ personally oversees every aspect of the work process for every project we work on," begins his brother, head of production Leopoldo Palomo. "Nothing comes out of the studio unless he's absolutely happy about it. Obviously sometimes you don't really like a particular idea from an agency and yet you must go ahead with it; but in terms of our share in production, there's not a single item that does not bear JJ's OK on it."

'Keloid', Big Lazy Robot's recent in-house project, is the one he and the team are most proud of having created so far. Edited like a movie trailer, the short portrays an eerie future in which mankind remains at war; despite the enhancements to technology and artificial intelligence the world over. The team predominantly used 3ds Max, V-Ray and NUKE to create 'Keloid', shooting it with their own equipment on a set that was rented for only a day, and recording the mo-cap movements with a Microsoft Kinect. Creating the film was a dream project that BLR ended up working on for over three years.

“JJ personally oversees every aspect of the work process for every project we work on. Nothing comes out of the studio unless he's absolutely happy about it”

Leopoldo Palomo, head of production

Contributors



JJ Palomo
CEO, lead artist,
composition artist

Juan Civera
Rigger and animator

Leopoldo Palomo
Head of production



Much of the credit, Leopoldo Palomo explains, goes to JJ Palomo, who took the unusual step of leading his company away from work on commercial projects. "Our boss had the courage to say, 'I'm going to spend a year or more with no commercial projects, no income and no interruption,'" he tells us. "It's only when you run a company that you realise the merit in doing such a thing. I think it takes a lot of guts to turn down juicy commercial projects, and all because you really want to focus on doing something you believe in."

"The secret was to put some money in the bank first and then treat the whole thing as if it were a paid project for another company," Palomo continues. "We dealt with it as if there were a rich client waiting for us to complete their project."

Next came 'i-DIOTS', Big Lazy Robot's following promotional clip. "After all the hard work on 'Keloid', the boss wanted to do something within a more

A Impressively, the BLR team produced everything in the 'Keloid' short themselves, from the music to the shooting, editing and rendering. Character and story development were a big focus too

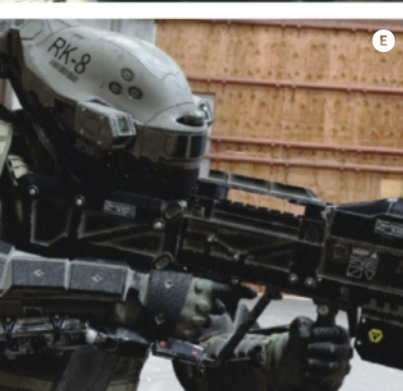
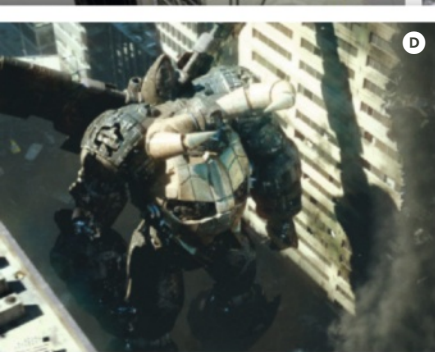
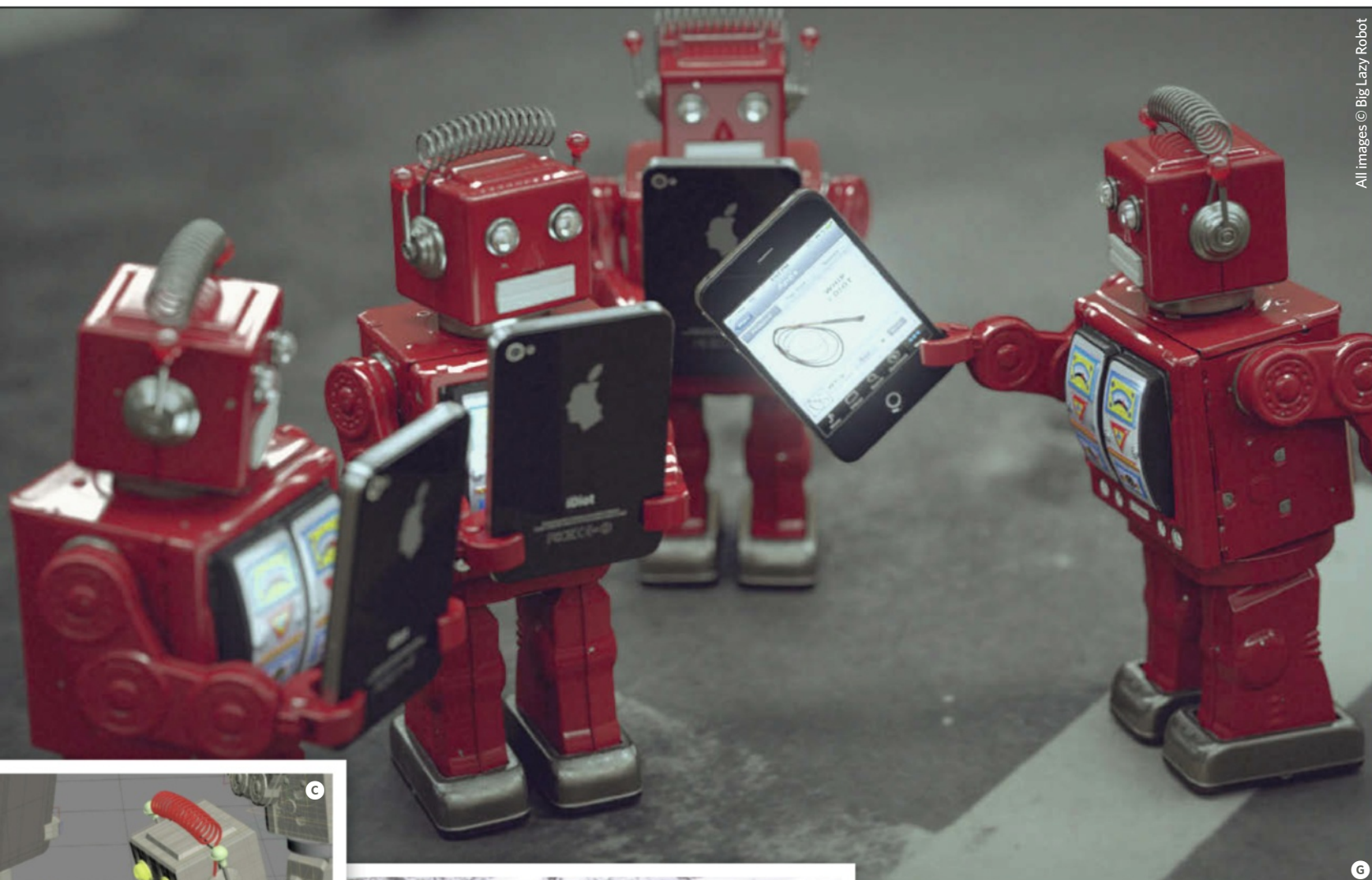
B "When doing a personal project, BLR can create all concepts and ideas," says Palomo. "On commercial projects you have a story line you can't deviate from, so creativity ends up becoming a risk"

portfolio highlights

- 2013** i-DIOTS
- 2011-2013** Keloid
- 2012** Absolut - Greyhounds
- 2010** Phillips - The Gift
- 2010** Mercedes E 300L
- 2009** Exploit Yourself
- 2009** Saturn Evolution

Here are some of the big budget movie projects Big Lazy Robot have worked on:





relaxed, fun atmosphere," Palomo explains. Like 'Keloid', 'i-DIOTS' also featured plenty of robots, taking a light-hearted approach to criticising our apparent need for happiness based on things we don't necessarily need, such as expensive smartphones. The team was stunned at the huge reception it got, growing faster in the public eye than even 'Keloid' managed.

"We had become experts in doing robots, but we never really set out for it specifically," reveals Palomo. "We only realised it when one day somebody called the office and said 'Hey, I need to do a commercial with a robot in it and I've heard you're the best guys to do it'." Nevertheless, the team tells us that they believe sci-fi is a genre in which there's still a lot to say – something they've already proven with their shorts. Whatever their next project, you can bet it will be big and have robots, but be anything but lazy.

C When creating their short 'i-DIOTS', the BLR team used Japanese robot kits and an environment made of cardboard houses to emphasise the message of a dull, homogeneous atmosphere

D "Keloid" had nothing but challenges all along," reveals Palomo. "Every time we sent a render to the farm, we would get a system breakdown in return. Success came afterwards, in the shape of recognition

E "Five years ago I asked JJ to have a robot in our logo, just for the sake of common sense," remembers Palomo. "There was a time in which virtually all assignments we had were related to robots!"

F When working on an in-house project, the team starts with four or five ideas, before whittling them down to one core concept. This needs to be something the whole team is happy with, as it is the guiding light of the project

G With the 'i-DIOTS' short, the team showcased happiness based on unnecessary decadence – luxury cars, digital TV and expensive smartphones that do everything except make a decent phone call



Industry insider Bre Pettis

CEO, MakerBot

From schoolteacher to CEO of MakerBot, we sit down with 3D-printing pioneer Bre Pettis to learn what's next for the ever-growing industry

About the insider

Job title CEO

Country USA

Company website
www.makerbot.com

Biography Bre Pettis has led MakerBot as CEO since its inception in 2009. Prior to co-founding MakerBot, Pettis co-founded the Brooklyn hacker collective NYC Resistor, where MakerBot technology was first created, tested and proven. He was instrumental in building the first prototypes of MakerBot's 3D printers and has become known worldwide as a leading evangelist for personal manufacturing. In 2006, Pettis started the popular 'Weekend Projects' video podcast for *Make: Magazine* where he taught millions of viewers to create various objects, from pinhole cameras to hovercrafts. He also introduced the blog at the popular online handcrafts marketplace, Etsy.

On the day we interview him, Bre Pettis is in London to accept *The Economist's* Innovation Award after being made the 2013 winner for his work.

Of course, as the CEO of MakerBot, this is hardly the first time he has been in the spotlight. In the years since starting the company in 2009, Pettis has been awarded the 2012 Disruptive Innovation Award from the Tribeca Film Festival, been a guest on *The Colbert Report* and even graced the cover of *WIRED*, among his many other appearances and talks.

For MakerBot too, the past year has been an important one. The company, which has been referred to as the Apple of 3D printers, not only completed its merger with leader in professional 3D printing, Stratasys, but also introduced the big brother to its fourth-generation Replicator 2 with the MakerBot Replicator 2X Desktop 3D printer. It's hard to believe that before MakerBot, Pettis was an art teacher in the Seattle Public Schools system. Developing a 3D printer back then had simply been a matter of necessity. "I wanted a 3D printer and couldn't afford one, so I started working on an early prototype in 2007," Pettis explains. "Next thing you know, me and a couple of friends got together and started a business. We all wanted one but couldn't afford it, and we wanted everybody who wanted a 3D printer to be able to have one too."

What's the most exciting way the 3D-printing industry has evolved during your time as MakerBot's CEO?

When we started, for the first couple of years I had to explain to people what 3D printing is. Now we actually get to tell people what you get to do with it and we're rapidly approaching the point where everybody knows someone with a 3D printer and it's becoming so much more accessible.

The thing that excites me most about where we're going is that we're at the point where the next step is crossing the threshold of "what are ordinary people

going to do with this," and "what is it going to be like when everybody has one?" That's the future.

What were your main aims when you first started introducing MakerBot's desktop 3D printers to people across the world?

We had been working on the Rep Rap project: humanity's first free desktop 3D printer that could self-replicate by making a kit of itself that anyone could assemble given the time and the materials. Then we realised that we actually weren't necessarily interested in creating a machine that could be self-replicated, we wanted something that was easy for people to use, which is a different goal.

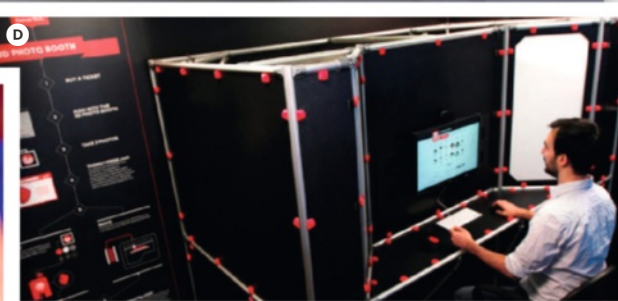
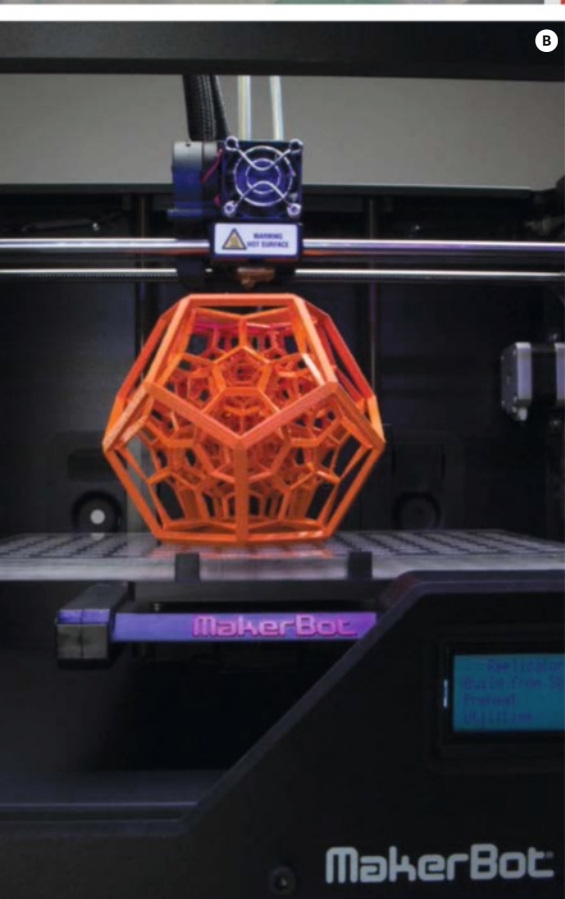
For us, in many ways, the MakerBot Replicator 2 is when we locked in the technology and built a reliable machine. It wasn't just for tinkerers at that point. It was for professionals who didn't want to spend ages at the machine – they just wanted to use it. We've shifted lots of these machines to NASA and jet-propulsion laboratories and companies all around the world that actually do amazing engineering work with them. It makes me really happy. It also really represents a shift for us being able to manufacture them in mass quantities to meet demands. Before that, it had all been really niche – we went from 5,000 square feet to over 100,000 square feet of manufacturing space in total. We've also just passed 400 staff so we're officially a small business, I'd say!

3D scanning

Pettis discusses the possibilities that desktop 3D scanning can bring to the 3D printing market

"The desktop 3D scanner is a fantastic piece of kit. You don't have to know CAD anymore for a 3D printer – you can just sculpt something up out of clay or carve something out of wood and put it on the digitiser's platform, then in less than 12 minutes you'll have a design that you can 3D print."





How does one go from being a schoolteacher to being the CEO of a successful 3D printing business?

You know, I think most people think engineering is something you have to go to school for, but I didn't go to school for engineering. It's one of those things where other ways into engineering are possible, especially if you just try. If you just keep trying to make your next version better than the last then you're in good shape – you're going to get there.

I was a schoolteacher in 2006 so I've had to really learn and grow a lot! I've been lucky enough that I've been able to hire incredibly smart people and for me it's been a real growth experience being able to become the person that the company needed to get things done.

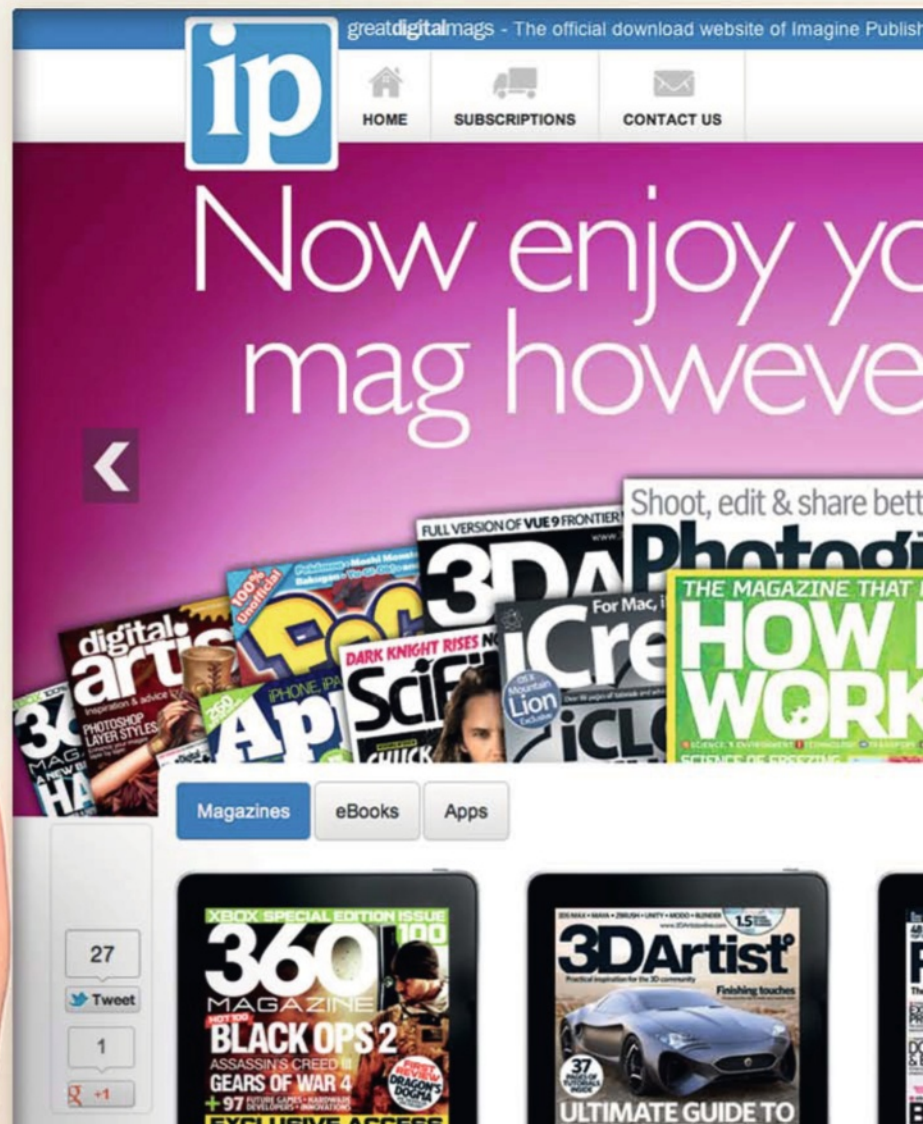
A "No matter what you are into, if you start doing 3D printing then you're going to be a pioneer in this field. It's still at a very early stage," states Pettis

B With the Replicator, the team aimed to build a machine for professionals who wanted a practical piece of kit, rather than something to just tinker with

C Reliability, build volume and demonstrable tolerance are elements that Pettis tells us everyone should look out for in the best 3D printers

D "A set designer started using the MakerBot and it's changed the way she works," says Pettis. "She's now an entrepreneur, selling tiny doll house furniture"

E MakerBot also sells a wide range of materials optimised for its printers, from bioplastic PLA to translucent and even glow-in-the-dark PLA



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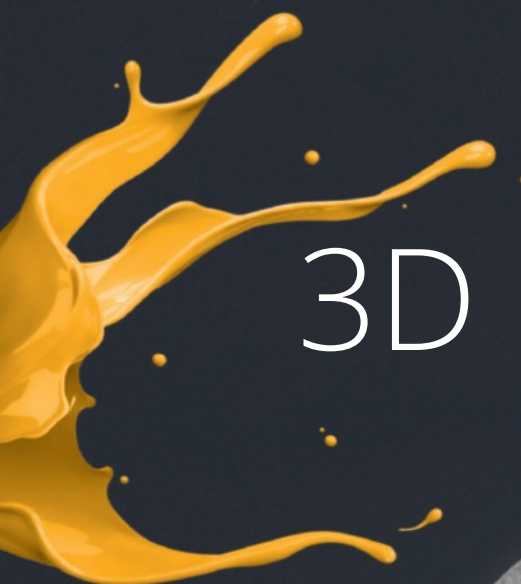
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